

3 0455 0003 3492 0



BLM - ALASKA RESOURCES LIBRARY
TN880.51.F6E682
Guidelines for preparation of an environ



ALASKA RESOURCES LIBRARY
Bureau of Land Management

**Guidelines for preparation of an environmental
impact statement for the Foothills (Yukon) Limited
gas pipeline, Yukon Territory - Canada**

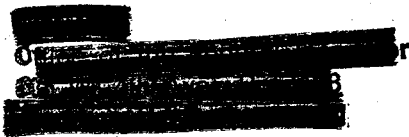
TN
880.51
.F6
E682
1977

GUIDELINES FOR PREPARATION OF AN
ENVIRONMENTAL IMPACT STATEMENT
FOR THE
FOOTHILLS (YUKON) LIMITED GAS PIPELINE
YUKON TERRITORY - CANADA

ALASKA RESOURCES LIBRARY
Bureau of Land Management

Merged with
A.R.L.I.S.
ANCHORAGE, ALASKA
Est. 1997

TN
880.51
.F6
E682
1977



ISSUED BY THE
ENVIRONMENTAL ASSESSMENT PANEL

DECEMBER, 1977



Pêches et Environnement
Canada

Fisheries and Environment
Canada

FEDERAL ENVIRONMENTAL ASSESSMENT REVIEW OFFICE
OTTAWA, ONTARIO
K1A 0H3

ARLIS
Alaska Resources Library & Information Services
Library Building, Suite 111
3211 Providence Drive
Anchorage, AK 99508-4614

TABLE OF CONTENTS

	<u>Page</u>
1. INTRODUCTION	1
2. OVERVIEW SUMMARY	1
3. PROJECT SETTING	2
3.1. Background	2
3.2. Declaration	2
3.3. The Need	2
4. DESCRIPTION OF THE PROPOSAL	2
4.1. Pre-construction	3
4.2. Construction	3
4.3. Operation and Maintenance	5
4.4. Post Construction Restoration	6
4.5. Abandonment	6
5. EVALUATION OF ALTERNATIVES	6
6. ENVIRONMENTAL SETTING	6
6.1. Climate	7
6.2. Terrain	7
6.3. Hydrology	8
6.4. Vegetation	8
6.5. Fish and Wildlife	9
7.0 LAND, RESOURCE, DEMOGRAPHIC AND SOCIAL FACTORS	10
7.1 Land and Resource Use	10
7.2 Demography and Social Setting	11
8. DESCRIPTION AND ASSESSMENT OF ENVIRONMENTAL IMPACTS	11
9. MITIGATION OF ADVERSE IMPACTS	12
10. RESIDUAL IMPACTS	13

11.	ASSOCIATED PROJECTS	13
12.	ANNEXES	13
12.1	Appendix A	14

1. INTRODUCTION

Organization, content and completeness of the EIS are the responsibility of the Proponent. However, in preparing this document the Proponent must take into consideration information deficiencies identified in the hearings held under the Environmental Assessment and Review Process and which resulted in the preliminary Report to the Minister (July 27, 1977). The EIS should include, but not necessarily be limited to, the topics discussed in these guidelines.

2. OVERVIEW SUMMARY

The Overview Summary should be written in such a manner as to allow reviewers to focus immediately on items of concern. It should be written in terms understandable to the general public and in a format that allows it to be extracted directly for publication by the media (if this is necessary), or for use by senior executives requiring a rapid appraisal of the situation.

The Overview Summary should briefly describe the project, the probable significant environmental impacts, the ameliorating and mitigating measures to be implemented, and the significance of the residual environmental impacts following amelioration or mitigation. Any environmental impact aspects of the development which might stimulate public concern should be described clearly. The summary should also clearly identify data gaps or knowledge deficiencies, and the limitations they have imposed on the Environmental Impact Statement (EIS). The number of copies of the Environmental Impact Statement and Overview Summary required by the Panel for Public and

Panel review shall be determined by the Panel Chairman at the time of publication.

3. PROJECT SETTING

3.1. Background

The EIS should include a brief chronological history of the development of the project.

3.2. Declaration

The Proponent should be identified and should take responsibility for statements and judgments in the EIS.

3.3. The Need

The Proponent should provide evidence of the demand for the proposed pipeline. The timing and routing of the project should be outlined with respect to this present or expected demand.

This section should include the primary purpose of the proposed facilities and how the proposed action fits into federal, territorial, provincial (if applicable), regional, and municipal plans and requirements. An outline of historic, existing and probable future demands, and the location of such demands should also be outlined.

4. DESCRIPTION OF THE PROPOSAL

The EIS is to include a clear description of the proposed project, both at completion and in its various phases, so that

predicted impacts can readily be related to specific features of the proposal. Topographic or photomosaic maps of suitable scale should be used to depict the route location and the locations of rights-of-way, new access roads (permanent or temporary), waste disposal sites, chilling and compressor stations, aircraft landing facilities, storage areas, construction camps, communication sites and other ancillary facilities. In addition, the description should include, but not necessarily be limited to, the following detail:

4.1. Pre-construction

- a) nature, proposed scheduling, methods, and extent of right-of-way surveys;
- b) proposed schedule and method of right-of-way clearing, extent of clearing, and method(s) of disposal of slash;
- c) location, proposed scheduling and detail of all stream crossings.
- d) location and detail of access roads.

4.2. Construction

- a) all plant and operating units to be constructed, such as compressor stations, unloading and storage facilities, communication installations;
- b) the method, routing and timing of pipe delivery, and construction procedures to be used for all mainline and lateral pipelines in the system;
- c) typical designs to overcome problems associated with a chilled pipe in frozen and unfrozen ground and a warm pipe in frozen and unfrozen ground. Specific attention should be addressed to design and construction timing in ice-rich permafrost and to subsequent problems of frost

heave and/or thaw settlement. For each such typical design, detailed quantitative geo-technical, hydrologic, meteorologic, or other relevant technical data should be provided for a representative site or interval along the pipeline route at which the design would be employed.

- d) design and proposed scheduling of stream and lake crossings and approaches;
 - 1. detailed design of all stream and lake crossings, including approaches, for which special crossing crews would be employed; each such design should be supported by detailed quantitative geo-technical, hydrologic, meteorologic, or other relevant technical data.
 - 2. typical designs for stream or lake crossings for which mainline crews would be employed; for each such typical design, detailed quantitative geo-technical, hydrologic, meteorologic, or relevant technical data should be provided for a representative crossing at which the design would be employed.
- e) location and design of shut-off valves;
- f) schedules for construction by spread;
- g) construction camp details, such as size including area occupied and number of personnel, period of use, water supply, sewage treatment systems and evidence of capability to adhere to receiving water quality standards,
- h) storage sites for fuel and hazardous chemicals;

- i) requirements for construction materials such as concrete aggregate, granular fill, rip-rap, and the locations of borrow sites;
- j) location and standards of temporary and permanent access roads, including culvert designs and installation, and methods of road construction;
- k) designs to accommodate seismic activity;
- l) details of hydrostatic testing and line purging procedures;
- m) methods to deal with the effects of aufeis development;
- n) details of contingency planning for the handling of environmental emergencies such as fires, spills of hydrocarbons and hazardous chemicals;
- o) plans for monitoring and controlling environmental impacts throughout the construction phase.
- p) solid waste disposal methods.

4.3. Operation and Maintenance

- a) commissioning or start-up procedures for the project;
- b) technical and operational procedures, including flow diagrams, timing schedules and inspections;
- c) normal maintenance, including routine scheduled maintenance, anticipated maintenance problems and plans for any partial or complete shutdown for maintenance;
- d) right-of-way maintenance and surveillance methods including final right-of-way grading and re-vegetation proposals; detailed plans for grading and re-vegetation at several locations which are representative of vegetation, soil, and permafrost conditions existing along the route.

- e) contingency plans for gas ruptures and blowouts and for spills of hydrocarbons and hazardous chemicals;

4.4. Post-construction Restoration

- a) plans for removal or other disposition of temporary structures, and facilities, hydrocarbons and hazardous chemicals;
- b) plans for temporary roads, bridges, and culverts.
- c) plans for the rehabilitation and re-vegetation of disturbed areas, such as gravel pits, quarries and rights-of-way.
- d) details on methods of blocking or removing access to abandoned facilities.

4.5 Abandonment

- a) relocation or termination plans for all pipeline and related facilities;

5. EVALUATION OF ALTERNATIVES

Within and outside of the chosen corridor the alternatives considered in selecting the specific location or alignment of the pipeline should be equally evaluated and discussed with respect to environmental impact.

6. ENVIRONMENTAL SETTING

The purpose of this section is to provide the necessary background information against which the predicted environmental impacts are to be considered.

In describing the existing environment, the EIS should emphasize site specific, unique, or sensitive environmental features of particular importance which could be affected by pipeline location.

The description must relate to the assessment of environmental impact in the right-of-way and adjacent areas potentially affected. A qualitative and quantitative description of resource uses that may be affected should be included.

Maps of appropriate scale should be included to illustrate resource and environmental information. The following list of environmental features is provided for guidance:

6.1. Climate

- a) extremes and means of monthly temperature, numbers of frost-free days and freeze-thaw cycles on an annual basis;
- b) monthly precipitation, frequency of freezing precipitation and depth and duration of snow cover;
- c) prevailing wind speed and direction, frequency, persistence, extent and location of temperature inversions; fog, including ice fog; smoke and haze.

6.2. Terrain

- a) topographic, physiographic and geologic features, as well as geomorphic processes within the project area;
- b) physical and chemical characteristics of the soil, soil profile classification, depth, total overburden depth, and petrology of rocks present;
- c) permafrost (continuous and discontinuous) distribution and temperatures, ice content, characteristics of active layer development, and the extent and character of permafrost degradation problems;

- d) erosion potential of slopes, and recognized physical hazards such as land slides, mud flows, avalanches, and seismic activity along the route;
- e) extent and nature of unique geological/landform features.
- f) identification and availability of material suitable for borrow.

6.3. Hydrology and Limnology

- a) description of physical, chemical and biological parameters in waters likely to be affected, including seasonal water quantity and quality regimes; ice scour; ice jams; channel migration potential;
- b) data necessary to evaluate effects of water uses, in all project phases, including the alteration of watercourses, use of coffer dams, etc.;
- c) data necessary to evaluate the effects of withdrawal and disposal of water for hydrostatic pipe testing;
- d) effect of domestic effluent loading on streams.

6.4. Vegetation

- a) biogeoclimatic zones and forest cover, including forest stand structure and maturity;
- b) plant communities within the proposed corridor, indicating relative abundance of species, importance to man, and importance to native fauna as habitat and food;
- c) undisturbed, rare or unique vegetation; plant life of special economic, historic, social, or aesthetic value.
- d) fire hazard in the pipeline right-of-way; the flammability of vegetation at different times of year.

6.5. Fish and Wildlife

- a) abundance and seasonal distribution, within the project area, of those species of fish, amphibians, birds and mammals considered to be of significance with respect to recreational, commercial, scientific, ecological, aesthetic value, subsistence or domestic use value;
- b) rare or endangered species which may be affected by the project;
- c) periods of fish migration, spawning and embryonic development, and locations of fish spawning and overwintering areas relative to water-course crossings;
- d) timing, location and extent of waterfowl nesting and staging;
- e) areas critical to the life cycles of wildlife, including waterfowl staging and moulting areas, leks, mineral licks, denning and nesting areas, migration routes, winter ranges, lambing/calving areas, etc. of big game animals, fur bearers, or other economically or recreationally valuable species;
- f) commercial, recreational, domestic and native food fishing activities and harvest, and the ability of fish populations to withstand increased fishing pressure resulting from improved public access;
- g) hunting activities and harvests, and the ability of wildlife populations to withstand increased hunting pressure resulting from improved public access;

- h) biological data on wildlife populations in sufficient detail to permit an estimation of the impact of the project and the design of mitigating measures.

7.0 LAND, RESOURCE, DEMOGRAPHIC AND SOCIAL SETTING

The following information may be provided either by the proponent or by the initiating department. This type of information will assist the Panel to better assess the environmental impact of the project within the land, resource, demographic and social setting of the areas potentially affected.

7.1 Land and Resource Use

- a) the nature, extent and location of present and projected utilization of land and resources which have potential to be affected by the project, including uses such as: agriculture, forestry, mining, parks and recreation areas, game preserves and sanctuaries, critical habitat areas, traditional hunting, fishing and trapping areas, archaeological and historic sites;
- b) other linear developments such as highways, roads, railroads, pipelines, and transmission lines which taken together with the pipeline project, might have cumulative effects;
- c) information and data on the extent and location of Crown and private lands including Indian Reserves, parks, settlements, reserves under the International Biological Program as well as other entitlements or special status areas.

- d) unique natural aesthetic features within and adjacent to the right-of-way;
- e) regional and local land use plans and policies in so far as these are current and publicly stated.

7.2. Demography and Social Setting

- a) characteristics of the population including numbers, distribution, communities, employment, public facilities and housing;
- b) cultural, social, recreational, and economic setting of the general area;
- c) attitude of the local population towards the environmental impact of the project;
- d) ability of local communities to accommodate workers, other than those employed by the proponent and living in the proponent's campsites, during construction, and the need to provide and service new town sites, trailer parks or other housing arrangements and in particular the environmental effects of creating such new developments.

8. DESCRIPTION AND ASSESSMENT OF ENVIRONMENTAL IMPACTS

The EIS should describe expected environmental impacts of the proposal, with emphasis on impacts which are likely to cause major environmental disruptions. These can be defined as impacts, either long-term or short-term in nature, that: (1) enhance, disrupt, impair or destroy existing features, conditions or processes in the natural environment; (2) cause enhancement of, or conflict with, established, traditional or historic

land use and ways of life; (3) affect the livelihood or health of segments of the human populations; and (4) significantly change the environmental options.

The planning of study programs to assess potential impacts must take into account the deficiencies in environmental data identified during the initial hearings of the regulatory process. Where factual data are unavailable or of questionable quality, the EIS should clearly state that the predicted impact is based on subjective judgment, and that knowledge gaps exist. Impacts should be considered for the pre-construction, construction, operation and abandonment phases of the project.

9. MITIGATION OF ADVERSE IMPACTS

One function of the Environmental Impact Statement is to determine the extent to which the adverse environmental impacts of the proposal can be minimized or eliminated by implementing either stringent design standards or other mitigating measures. Options and measures available to avoid or mitigate harmful effects, or to enhance beneficial effects, should be discussed in the EIS. These might include such measures as: changes in location or design of the project; changes in scheduling of activities; rehabilitation of disturbed features; contingency plans; environmental education of construction and operational staff; enhancement of beneficial impacts; and surveillance and monitoring of environmental effects.

Explicit plans for impact mitigation should be outlined in terms which shall include, where appropriate, but are not necessarily restricted to, the topics identified in Appendix A.

10. RESIDUAL IMPACTS

Environmental impacts that will remain, despite mitigating measures, should be detailed in terms of their nature, extent, probable duration and significance. Of particular importance are those impacts which will foreclose certain options and opportunities with respect to future resource use and productivity, and land use in the pipeline corridor.

Should further information be required to fully assess a particular impact and to provide for its mitigation, the proponent should propose studies to obtain information necessary for completing the assessment.

11. ASSOCIATED PROJECTS

The EIS should consider the relationship of the proposal to other existing or planned projects, including those not controlled by the proponent. In particular the relationships of the proposal to a Dempster Lateral, N.C.P.C. power projects, the Shakwak Project and the Alaska Highway reconstruction program should be discussed. It should identify possible environmental concerns that might arise from stimulated development both of and by these associated projects. The possibility of further linear developments within the corridor, including shared use of the corridor, should also be discussed.

12. ANNEXES

The annexes should include a list of references cited and copies of reports developed from studies associated with the environmental impact assessment.

APPENDIX A

Details of Mitigative Measures, Construction and Operation, and Maintenance Plans

Relative to Potential Areas of Environmental Impact

The following are examples of impacts requiring mitigative measures and details of construction, operation and maintenance plans required for areas where environmental impact may be anticipated.

1. Terrain and Vegetation

- a) methods of handling potential problems arising from earthquakes, landslides, avalanches, and other mass movements; design of pipeline and auxiliary buildings with reference to the mitigation of such hazards;
- b) methods of minimizing disturbance of vegetation and the organic mat in permafrost or high ice-content areas;
- c) methods of minimizing instability due to differential thaw or freezing, loss of ground strength, and thermokarst in permafrost areas; where uneven settlement or heave is inevitable, safeguards against pipe rupture or deformation should be proposed;
- d) terrain stabilization and erosion control procedures to be outlined including: revegetation, diversion structures, and rip-rap protection;

- e) plans for mining and borrow pit operations, including dimensions and volumes of excavations; location in relation to possible interactions with water bodies;
- f) borrow pit restoration including stabilization, revegetation, and disposition of surplus borrow materials;
- g) proposed cuttings through forest; provisions for forest preservation, the utilization of timber;
- h) locations and methods of blasting; controls on proposed use of explosives (in particular in or near water bodies, sheep ranges, and raptor eyries);
- i) plans for minimizing drainage disruption; extent of drainage disruption, where it is expected;
- j) methods of preserving the natural setting through the design and location of permanent facilities and the creation of buffer strips of natural vegetation between pipeline facilities, and public roads and facilities;
- k) plans to schedule clearing and actual pipeline construction so that a lengthy interval does not occur between the two operations.

2. Stream, River and Lake Crossings

- a) details of assessment of design flood periods and method of determination; water crossing designs and scheduling as related to interruption of spawning, rearing and safe upstream and downstream passage of fish;
- b) for crossings beneath the watercourse - depth and location of maximum anticipated scour; proposed design depth and method of placement of pipe; anticipated flow blockages either by exposed pipe acting as a direct barrier or by ice buildup around a chilled pipeline;

- c) pipeline routes through areas of water with potential for shorefast or drifting ice; relation of depth and location to ice flows, pressure ridges, and ice scouring (e.g. Kluane Lake);
- d) depth of burial and associated construction activities in relation to the elimination of habitat for bottom-dwelling organisms and to sub-lake or river permafrost;
- e) details of project on associated runoff, bank erosion, migration of stream channels, river regime modification, ice jams, and icings;
- f) plans for fish passage structures where structure change or velocity barriers impede fish movement;
- g) design of approaches to river crossings so as to maintain stability of valley walls and river banks and to minimize changes that could lead to slope failures, gullying, entry of suspended solids, changes in water levels, degradation or growth of ground ice;
- h) the design of culverts under access roads, and of overhead pipe spans for small stream and gully crossings; for culverts include predicted velocity profiles (lateral and longitudinal);
- i) methods to be used in the construction and removal of temporary stream crossings (e.g. materials to be used for reinforcement of ice bridges);
- j) pipeline routes under water bodies with potential for vessel traffic and anchorage (e.g. Yukon River); relation of maximum depth of anchor drag to the depth of pipeline burial;

- k) specific measures designed to ensure the safety of underwater pipelines.

3. Other Water Resource Subjects

- a) the hydrological and biological impact of water utilization in terms of planned sources, volumes required, and timing of extraction and reinjection;
- b) methods of minimizing the addition of sediment and the introduction of hydrocarbons and hazardous chemicals into water bodies, particularly in respect to access roads or bridges;
- c) methods of minimizing the addition of sewage effluents into water bodies;
- d) dates and proposed methods of construction within 300 feet of any water body frequented by fish and for activities involving a continuous downslope to a water body; presentation or creation of buffer strips of natural vegetation between pipeline facilities and water bodies;
- e) interruption to river flows and alteration of lake levels in terms of timing and impact.

4. Fish and Wildlife

- a) schedules of construction activities and evidence that the project contains the flexibility to allow pipeline, road, or other construction to cease for periods of time when important areas critical to fish, wildlife, or waterfowl are temporarily threatened;
- b) methods of minimizing the restriction of movement of migratory animals (in particular large animals such as moose, deer, caribou);

- c) plans for routing around or otherwise protecting areas used as: feeding or nesting areas by migratory waterfowl or raptors; as habitat by fur-bearers or big game animals; areas critical to the life cycles of wildlife;
- d) methods of minimizing disturbance of wildlife populations resulting from greatly increased human intrusions - the operations of boats, ground vehicles, aircraft, and compressor or pumping stations;
- e) safeguards proposed for the habitats of rare or endangered species;
- f) plans for assessing and controlling potential overfishing and hunting;
- g) plans to restore fish and wildlife habitats that are damaged by pipeline activities.

5. Waste, Toxic Materials and Noise

- a) methods of solid waste collection and disposal to avoid health hazards, dispersal by wind, or attraction of wild animals;
- b) waste incineration procedures designed to minimize air pollution, ice fog development, and fire hazards;
- c) treatment and disposal of sewage with provisions to prevent seepage or leakage which may contaminate the surrounding environment (ref. also 3.c.);
- d) the nature, transportation, use and disposal of any pesticides, herbicides, pipe coating materials, anti-corrosion materials,

- flushing agents, or other toxic substances, proposed for the project and information on their expected persistence, toxicity and mobility in surrounding ecological system; toxic materials storage facilities, distance from nearest watercourse;
- e) plans for compressor station silencing equipment and/or physical barriers to noise; the level and frequency distribution of noise generated by construction and operations equipment;
 - f) proposed volume, composition and disposal of pipeline test fluids;
 - g) methods of disposal, incineration or other control of gaseous and liquid wastes from compressor/pumping stations, flare pit operation if used, or anticipated quantities of other emissions to the atmosphere;
 - h) measures to ensure that there will be no discharge of petroleum products or other pollutants into or onto any lands or waters;
 - i) methods of disposal or utilization of cleared trees and vegetation; procedures for slash disposal particularly in permafrost, sensitive or populated areas, near water bodies, etc.;
 - j) methods of preventing or minimizing sediment, slash or other waste introduction to water bodies;
 - k) methods of disposal of waste materials collected during pipeline "pigging" operations (if used);
 - l) composition, quantities, and disposal of materials for pipeline purging (if used);
 - m) methods to minimize ambient pollutant levels arising from compressor station gas turbine operation. Assessment of the

effect of these pollutants on the surrounding ecosystem during normal and "worst-case" meteorological conditions (site-specific assessment of buildup under thermal inversion conditions).

6. Land and Resource Use

- a) methods to reduce environmental impact on land uses and capabilities on or near the pipeline corridor; details of any relocations or other mitigation measures which may be required relative to the project;
- b) probable temporary restrictions on land uses and capabilities during construction; effect of construction on highway traffic patterns;
- c) methods to avoid or reduce impacts on Crown and private lands including Indian Reserves, parks, settlements, reserves under the International Biological Program as well as other entitlements or special status areas;
- d) methods of reducing the impact of the pipeline and its construction on those natural resources from which a person or persons may derive any part or all of their livelihood by trapping, hunting, and/or fishing;
- e) details of surveys intended to identify archaeological, historic, and unique natural and aesthetically pleasing sites prior to and during the construction phase; procedures designed to ensure the preservation of such sites.

7. Environmental Emergencies

7.1 Gas

- a) the statistical probability of accidental loss of the gaseous product from the pipeline, and the probable quantity of such loss;
- b) the probable effects on people and on any environmental components, of the accidental ignition of concentrated combustible products, inadvertently released from the pipeline including under-water and under-ice releases;
- c) the adequacy, accuracy and effectiveness of routine methods and of systems for leak detection, and the maximum rate of loss of the product from the pipeline that could go undetected;
- d) contingency plans and response procedures for containment and suppression of fires resulting from the accidental ignition of escaping gases, including
 - i) provisions for the prevention of pipeline ruptures and control of escaping gases or other toxic materials;
 - ii) methods and procedures for restoration of the affected components of the environment;
- e) methods of fire prevention and suppression in the corridor including the maintenance of the necessary equipment caches and the availability of properly trained personnel for fire fighting in all areas where the pipeline crew's activities may cause fires.

7.2 Oil and Hazardous Chemicals

- a) contingency plans and response procedures for the protection and the safe removal and disposal of products accidentally or inadvertently released into the environment, including:
 - i) provisions for the prevention and control of accidental spills of petroleum products and other toxic materials;
 - ii) spill containment and disposal procedures, equipment, and equipment stockpile locations;
 - iii) techniques for spill clean-up under all seasonal conditions on land, into water bodies and at major depots and storage areas;
 - iv) methods and procedures for restoration of the affected components of the environment;
- b) methods of fire prevention and suppression for all flammable liquids and solids.