

**INFORMATION REQUIREMENTS
FOR REGULATED PIPELINES**

**Alberta Environment
Land Reclamation Division
Edmonton, Alberta
1988**

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1.0 INTRODUCTION

The mandate of Alberta Environment is to achieve the protection, improvement and wise use of our environment now and in the future. The information requirements outlined in this document reflect this mandate by emphasizing the objective of conserving our land resources through appropriate environmental planning.

This document is a guideline for the preparation of a Development and Reclamation (D & R) Application for a regulated pipeline. The purpose of preparing a D & R Application is to address environmental concerns and mitigate adverse environmental impacts during the construction, operation, maintenance and abandonment of a pipeline.

A regulated pipeline is defined in Section 1(h) of the Regulated Oil and Gas Pipeline Surface Operation Regulations (A.R. 207/76 and 161/79) as a pipeline that is both 150 mm or more in diameter and 16 km or more in length. This definition also includes pipeline gathering and distribution systems which have at least 16 km or more of pipeline in total with diameters of 150 mm or greater.

Pursuant to Section 4(1) of the Regulations, before commencing the construction, operation, alteration, extension or abandonment of a regulated pipeline, the proponent shall make application for D & R Approval. In accordance with Section 2 of the Regulations, D & R Approval is also required for the alteration, extension or abandonment of a regulated pipeline in existence prior to the enactment of the Regulations on September 1, 1976.

A Development and Reclamation Approval is required for the following alterations and extensions to a regulated pipeline:

1. An alteration or extension of 16 km, or more, of any diameter pipe to an existing regulated pipeline, or
2. An alteration or extension of any length or diameter of pipe to an existing regulated pipeline that is proposed to be located within a named river valley or within 30 m. of the upper breaks of a named river valley.

Pipeline operators submitting pipeline applications to the Energy Resources Conservation Board (ERCB) must indicate whether the proposed pipeline is an alteration or extension to a regulated pipeline.

Abandonment is defined as the permanent deactivation of all or part of a regulated pipeline, including the removal of all or part of the pipeline from the ground.

2.0 DEVELOPMENT AND RECLAMATION APPLICATION CONTENT

The D & R Application documents the route selection process, assesses environmental concerns arising from the project, and describes the appropriate mitigative measures. Applications for D & R Approval should reflect the best practical technology.

2.1 Project Description

Information to be included in the project description:

- purpose of the project.
- length and diameter of line, width of right of way.
- terminal locations and other control points.
- pipeline commodity, operating pressure and level of any sour gas facility as defined by ERCB Interim Directive 81-3.
- ancillary facilities such as camps, access roads and powerlines.
- project schedule.

2.2 Selection of Alternate Routes

Identify and document the major environmental, engineering and economic factors leading to the selection of alternative routes. A checklist of environmental concerns that may influence the selection of alternative routes is in Appendix A. Comprehensive biophysical inventories of the study area are not normally required.

2.3 Selection of the Preferred Route

Evaluate and discuss the significance of major impacts associated with the alternative routes, and select the preferred route on the basis of least environmental impact, as well as, on engineering, cost and landowner issues. Where possible be quantitative. Outline the reasons for selecting the preferred route.

Alternative methods for incorporating environmental matters into the route selection process are discussed in "The Route Selection Process: A Biophysical Perspective", available from Alberta Forestry, Lands and Wildlife.

2.4 Soil Investigations for the Preferred Route

When a preferred route has been chosen which traverses arable or pasture lands, soil information is required to identify and describe segments of the proposed right of way over which similar soils and soil conservation procedures will occur. Arable land includes all lands presently used for, or capable of, cultivation. Soil conservation procedures specified in the D & R Application must be based on the soil evaluation. A detailed guide to the preparation of a soil report is outlined in Appendix B "Soil Evaluations for Pipelines on Agricultural Land".

2.5 Environmental Protection Plan

An Environmental Protection Plan (EPP) is specific to a particular project and documents the construction, operation, maintenance and abandonment practices designed to minimize the impact of the project on the environment. This site-specific information is essential to the EPP. It is a "stand alone" document for use by project construction and government surveillance personnel.

Proponents should indicate all environmental protection measures on the alignment sheets or on other appropriate plans to ensure that the contractor is aware of the measures to be implemented. Mitigative measures are outlined in Appendix A and a more comprehensive document entitled "Environmental Handbook for Pipeline Construction" is available from the Land Reclamation Division upon request.

The EPP consists of two parts; a specifications book that describes in detail the protection measures and reference maps that show where specified measures are to be undertaken. EPP formats and methods of implementation are outlined in Appendix C.

3.0 REVIEW AND APPROVAL PROCESS

Prior to the construction of a regulated pipeline, four major approvals must be obtained. They are acquired in the following order:

- Ministerial Approval of the ERCB application pursuant to Section 8 of the Pipeline Act, issued by Alberta Environment;
- a permit to construct a pipeline pursuant to Section 7(1) of the Pipeline Act, issued by the ERCB;
- D & R Approval pursuant to Section 2 or 4(1) of the Regulated Oil and Gas Pipeline Surface Operation Regulations; and
- a Pipeline Agreement pursuant to the Public Lands Act (surface disposition approval on public lands only), issued by the Department of Forestry, Lands and Wildlife.

Appendix D notes a number of related approvals which also may be required for a pipeline project.

3.1 Preliminary Meeting

Proponents are advised to contact the Regulated Operations Branch, Land Reclamation Division (427-6323) prior to the preparation of a D & R Application. A preliminary meeting can be arranged between the proponent and government agencies before submission of a D & R application. The intent of the meeting is to discuss the significant environmental issues previously identified by the proponent. The meeting also enables the proponent to determine the level of detail required for environmental information and to arrange further meetings or field inspections with government field staff to facilitate the preparation and processing of the application.

At the preliminary meeting, the proponent should be prepared to present a project overview to government agencies, and to initiate discussions on issues that he has identified as being relevant to the project. If possible, the proponent should submit preliminary project information to government agencies at least five working days prior to the meeting.

3.2 Submission of Development and Reclamation Application

Applications for D & R Approval and for a permit to construct a pipeline are made to the ERCB. The ERCB refers the applications to the Land Reclamation Division of Alberta Environment for review and approval. Twelve to fifteen copies of the D & R Application will be required for referral to other government agencies and can be directed to Alberta Environment with advisement to the ERCB.

3.3 Review Process

Upon receipt of the D & R Application, Alberta Environment coordinates an environmental review of the application by government agencies. The department provides comments and recommendations to the proponent via the ERCB with respect to the environmental impact and mitigation of the proposed pipeline.

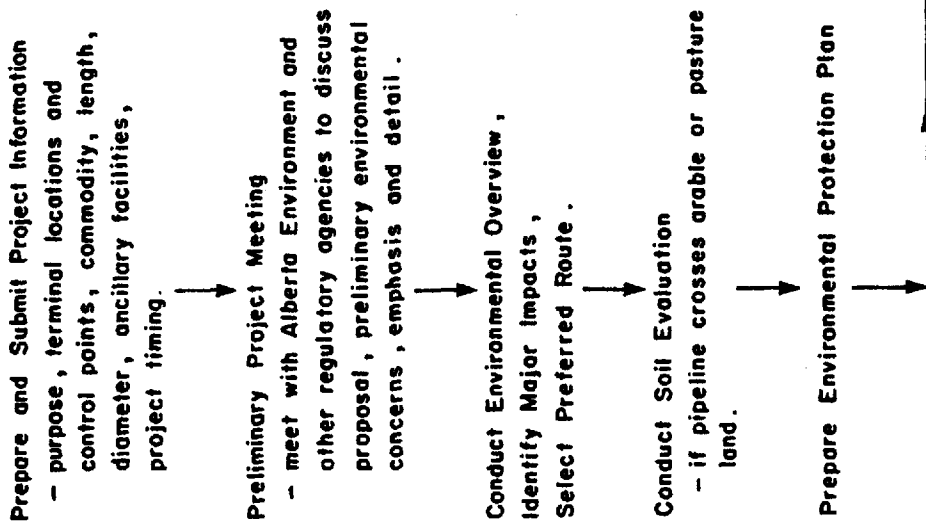
Once all issues regarding route alignment and right of way width are resolved, Alberta Environment issues the proponent a D & R Application Number. This number is required by the Public Lands Division of the Department of Forestry, Lands and Wildlife prior to their acceptance of an application for a Pipeline Agreement (PLA).

If a public hearing is conducted by the ERCB, Alberta Environment represents the Crown at the hearing. Alberta Environment issues D & R Approval to the proponent once all the issues regarding route alignment, right of way width, environmental protection and landowners are resolved.

The normal D & R Application review process takes approximately 45 days if the application is complete. Incomplete applications or applications submitted in two parts will require additional review time.

Figure 1 illustrates the preparation, submission, review and approval process for the D & R Application and lists a number of related approvals.

APPLICATION PREPARATION



APPLICATION SUBMISSION

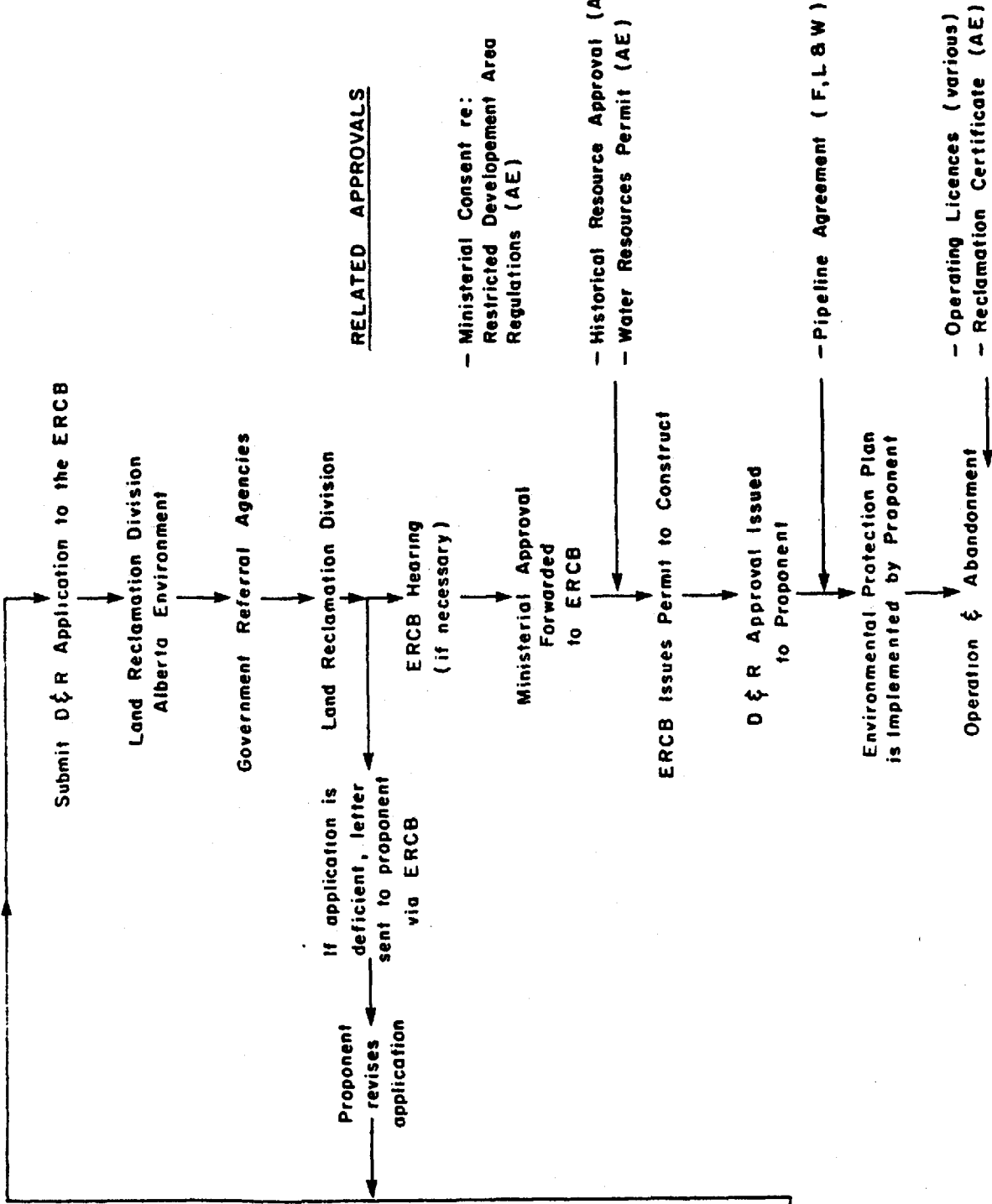


FIGURE 1

4.0 MONITORING OF CONSTRUCTION AND OPERATION

Once the D & R Approval is issued, the procedures specified in the Environmental Protection Plan (EPP) are enforceable under that approval. The proponent is responsible for ensuring that the contractor is fully conversant with the terms of the D & R Approval and the EPP. Construction and operation activities documented in the EPP should be monitored by the proponent.

Construction activities outlined in the EPP are monitored by the Reclamation Officers of Alberta Environment and Alberta Forestry, Lands and Wildlife. Where the EPP and subsequent approval incorporates items that are under the jurisdiction of other government departments, those items are monitored by the appropriate agency. Addresses of the Reclamation Officers and their telephone numbers are available from the Regulated Operations Branch (427-6323) of Alberta Environment.

5.0 PIPELINE ABANDONMENT

Prior to the abandonment of all or part of a regulated pipeline, D & R Approval is required. The D & R Application for abandonment should be sent to the ERCB for forwarding to Alberta Environment and should include:

1. reason for abandonment or removal of the pipeline.
2. intended disposition of the pipeline and ownership.
3. if the pipeline is to be removed from the ground, soil information and soil handling procedures for the conservation of agricultural soils.*

If at the time of initial abandonment, a regulated pipeline is not removed from the ground but is to be removed at a later time, an amendment to the D & R Approval is required at that later date. An application for amendment should provide the information outlined above.

Prior to the surrender of the right of way lease, the approval holder must obtain a Reclamation Certificate from the Land Conservation and Reclamation Council. Pursuant to section 43 of the Land Conservation Regulations, approval of Alberta Environment is required for the sale, lease or transfer of operation of all or part of a regulated pipeline.

*Refer to Appendix B "Soil Evaluations for Pipelines on Agricultural Land" to determine the appropriate level of soil information.

APPENDIX A
ENVIRONMENTAL ISSUES AND MITIGATIVE MEASURES FOR PIPELINES

1. ENVIRONMENTAL CHECKLIST

The following checklist is intended to cover most concerns which could affect the routing of the pipeline, as well as scheduling and methods of construction. Only items which are significant to the project need be addressed. Lengthy project area descriptions having little or no bearing on pipeline routing or construction should be avoided; for example, detailed lists of flora and fauna are not normally required. Please note that the use of Canada Land Inventory data for detailed routing studies is not appropriate.

A. BIOPHYSICAL

Geology and Landforms

- depth to bedrock and ease of excavation.
- origin and topography of surficial deposits.
- steep slopes and sidehills.

Soils

- soil evaluations.
- sensitivity to erosion by wind and water.

Water

- drainage basins and water bodies.
- streamflow pattern as it affects timing.
- water quality.
- ground water discharge sites (seepage areas and springs).

Vegetation

- ecoregion, dominant species, species distribution, rare and endangered species.

Wildlife

- critical wildlife habitat.
- key wildlife areas.
- ungulate winter ranges, calving and lambing areas, migration routes.
- waterfowl staging and production areas.
- upland bird dancing and strutting grounds.
- nests and dens of important species.
- threatened, rare and endangered species.

Fisheries

- critical fisheries habitat such as spawning, rearing and over-wintering areas, migration routes.
- threatened, rare and endangered species.

B. LAND USE

Agriculture

- cultivated lands, pasturelands, grazing leases or allotments.
- existing and proposed irrigated land and related facilities.
- existing and proposed drainage and related facilities.
- farmsteads, granaries and other structures.
- shelterbelts.
- wooded arable lands.

Forestry

- forest management agreement areas, quota holders and other leaseholders.
- existing and proposed cut blocks, haul roads, equipment crossings and other facilities.
- merchantable timber and salvage specification.
- road use agreements.
- forestry revegetation plots.

Resource Extraction

- petroleum, coal and aggregate deposits.
- existing and proposed extraction areas.

Development

- existing and potential urban, country residential and rural development.
- shelterbelts.

Transportation

- roads, railways and airstrips.
- pipelines and electric transmission lines.

Recreation

- intensive recreation: present facilities and uses, e.g., national and provincial parks, municipal parks, Alberta Transportation and Alberta Forest Service campsites and all significant potential development sites.
- extensive recreation: present areas used for activities such as hiking, back country camping, cross-country skiing, fishing, hunting, snowmobiling, wildlife viewing, recreational driving, significant landscapes and areas that have potential for these types of development.

Historical Resources

- Historical Resources Impact Assessment (if requested by Alberta Culture).
- location of archaeological, historical and paleontological sites.

Other

- Indian Reserves and Metis Colonies.
- Ecological Reserves and Natural Areas.
- registered traplines.

2. MITIGATIVE MEASURES

General

- notify landowners, occupants and appropriate government representatives before construction; document and consider their concerns.
- identify right of way limits and locations where additional right of way is required, such as crossings of watercourses, roads, rail lines and foreign pipelines; extra grading and spoil storage areas; or temporary slash windrows.

Forestry

- avoid interference with forestry operations such as harvesting, road haul and equipment crossings.
- prevent and control forest fires.
- prevent damage to adjacent trees during clearing; avoid spoil placement in treed areas.
- salvage merchantable timber and dispose of slash by burning, rollback or other acceptable methods.

Wildlife

- schedule construction to avoid periods when wildlife are most sensitive to disturbances, such as late winter in critical ungulate range.
- lessen short term impacts by maintaining breaks in snow and brush windrows, set-up pipe and open trench. Control the use of firearms and all-terrain vehicles by construction personnel, as well as the presence of dogs on the spread.
- reduce long term impacts by controlling access along the right of way, reducing line of sight and enhancing revegetation for food and cover.

Fisheries and Water Crossing

- observe timing windows or control stream sedimentation by using special precautions such as retaining hard plugs and installing the crossing quickly, fluming, damming and pumping, boring, bridging for vehicular crossings, storing spoil out of water and backfilling and recontouring with clean granular materials.
- ensure that stream flow is maintained and that fish movements are not hampered.
- minimize disturbance to downstream water users.
- properly dispose of test fluids and avoid fuel spills.
- restore stream beds and banks and promptly revegetate the right of way after initial clean-up.

Agriculture

- aid return of land capability by stripping, storing and replacing soil material on cultivated and pasture lands.
- strip root zone material on forested lands having potential for agriculture.
- carry out special materials handling techniques for saline, poorly drained, sodic, sandy, stony or other problem soils.
- shut down construction during wet weather to prevent severe compaction, or topsoil and subsoil mixing.
- schedule construction or use specialized construction techniques to

- minimize impacts on farm operations, crops, livestock, fences, shelterbelts, irrigation and drainage systems.
- remove stones and prepare the right of way for seeding.
- reduce grading.

Erosion

- salvage and replace soils and slash to aid revegetation on erodible areas.
- minimize grading requirements; dispose of excess spoil in stable locations. Install erosion and drainage control devices such as cross ditches and berms, trench breakers or sub-drains.
- revegetate the right of way within one growing season after initial clean-up through the application of appropriate seed and fertilizer mixes, application rates and techniques.
- control access along the right of way.

Special Land Use

- avoid construction during heavy use periods in recreational areas; restore and screen the right of way.
- limit interference with trappers and nearby residents.
- protect archaeological sites adjacent to the right of way.

APPENDIX B
SOIL EVALUATIONS FOR PIPELINES ON AGRICULTURAL LAND

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1.0 INTRODUCTION

This document outlines the expectations of Alberta Environment for soil evaluations for regulated pipeline applications. A soil evaluation is required in support of a Development and Reclamation (D & R) Application where arable or pasture land is disturbed. The evaluation is to provide information about the soils and landforms along a proposed pipeline to assist in soil conservation planning for pipeline construction.

These information requirements reflect Alberta Environment's objective to conserve soils during pipeline construction. Proper soil conservation planning is necessary to ensure that the soil is returned to its former capability. Industry is responsible for conducting proper conservation procedures, based on a thorough evaluation of soils, to ensure that the land's agricultural capability is not diminished by pipeline construction.

A soil evaluation for regulated pipelines is used to identify, describe and delineate segments of a proposed right of way over which similar soil conservation procedures will occur. The soil evaluation process includes the interpretation of information from aerial photographs, analysis of existing soil reports and field collection of soil and land information along a proposed pipeline right of way.

The soil evaluation is used to determine:

- topsoil availability, quality and depth.
- storage requirements for surface material and spoil, as well as adequate separation between piles.
- right of way width requirements.
- procedures and equipment requirements to remove and replace materials.
- problem soils and required special construction or soils handling procedures.
- reclamation and revegetation procedures, suitable species and possible soil amendments.

2.0 PLANNING

A soil evaluation must be properly planned to be effective. Planning should include a review of existing information, a joint government-industry meeting and the choice of an appropriate evaluation level.

2.1 Existing Information

Available information on soils, landforms, and surficial and bedrock geology of the study area should be reviewed. The Natural Resources Information Directory by Forestry, Lands and Wildlife (annual) lists sources of information. Use and document existing pipeline soil evaluations in the study area wherever possible.

2.2 Preliminary Meeting

Before detailed field work, industry is encouraged to meet with government to clarify the type and detail of soil information required to develop soil conservation procedures.

2.3 Evaluation Levels

The type and detail of soil information collected during a soil evaluation may be different for each pipeline and will depend on a number of variables including:

- the detail and availability of existing soils and related information.
- the presence of potential problem soils.
- the variability of the soils along the right of way.

Sites chosen for inspection must represent characteristic situations for each distinct segment of the right of way. Topographic features should be inspected to fully describe the soils and define the segment boundaries.

The number of inspections required per kilometre of right of way for an evaluation may vary. An alignment with high soil variability will require more inspections per kilometre than an alignment with low variability.

2.3.1 Level 1

Field collection of information is not required where:

- the proposed right of way closely parallels an existing right of way for which an appropriate soil evaluation is available to the proponent, or
- a 1:15,000 or more detailed soil survey is available for the area.

2.3.2 Level 2

Minimal field collection of information is required when:

- existing soils and geological information indicates the absence of problem soils such as Solonetzic soils, saline soils or problem parent materials (heavy clay, bedrock, gravel or sodic materials), or
- a 1:40,000 or more detailed soil survey is available for the area.

The soil and landform characteristics described in Tables 1 and 2 are collected at a density of at least one inspection per kilometre. Sampling for laboratory analysis may be required to confirm the absence of problem soils.

2.3.3 Level 3

Detailed field collection of information is required when:

- existing information indicates the presence of Solonetzic soils, saline soils or problem materials.

Soils should be inspected at a density of two to five sites per kilometre. Sampling for laboratory analysis may be required to verify the extent and significance of problem materials.

2.3.4 Combination of Levels

Combinations of the three evaluation levels outlined above may be required to describe the soils along a right of way. For example, existing information may indicate the presence of Solonetzic soils on one third of a thirty km pipeline right of way. A level 2 evaluation may only be required for twenty km while a level 3 evaluation may be required for the ten km with Solonetzic soils.

3.0 MAPPING

3.1 Aerial Photographic Interpretations

It is highly recommended that all information be mapped onto an aerial photographic base. With interpretation of aerial photographs, preliminary segments and possible inspection sites can be delineated before field work begins.

3.2 Map Segments

It is generally not necessary to delineate any segments shorter than 800 m, other than those described below, since it may not be feasible to change soil conservation procedures to accommodate every change in soil property. Usually one procedure can optimize soil conservation over a variety of soil conditions within one segment.

Segments less than 800 m which may require delineation include:

- sloughs or wet areas.
- stream crossings.
- road or highway crossings.
- extreme variations in topography.
- non-uniform areas of salt-affected soils.
- changes in land use.
- changes in parent materials.

3.3 Field Inspections

3.3.1 Inspection Techniques

Soil inspections are done using a number of techniques including shovel tests, hand augers or mechanical coring devices. If possible, inspections should be done on dry and unfrozen soil conditions. All inspection sites are plotted on the aerial photographic base or map presented in the report.

3.3.2 Visual Landform and Soil Characterization

Landforms and soils must be described and classified according to the Canadian System of Soil Classification (1978). Soils should be classified to the subgroup level. The

Canadian System of Soil Classification serves as a vital communication link between the individuals carrying out the soil evaluation and the regulatory agencies. Characteristics used to describe landforms and soils are noted in Tables 1 and 2.

3.4 Sampling For Laboratory Analyses

It is desirable that analysis of complete representative soil profiles be conducted. At minimum, laboratory analysis of the A and B horizons are required to confirm the extent and severity of problem soils where the preliminary inspection indicates their presence. Lab analysis to trench depth may be necessary where the suitability of subsoils in the upper 50 cm will be reduced following soil replacement. The need for analysis increases proportionally with trench depth.

Laboratory analyses are also required to determine quality of any subsoil materials which could be incorporated into the surface salvage material. This should include areas where the A horizon is less than 10 cm in depth, or where the A horizon is to be overstripped or not stripped at all. Subsoil materials to be stripped with the A horizon must be of sufficient quality that the physical and chemical properties of the replaced surface material will not be adversely affected.

The results of the analyses, along with other soil information, will be used to:

- assist the monitoring of problem soils by company and government field staff during and after pipeline construction.
- develop alternative soil conservation or other mitigation strategies to lessen potential impact.
- assist the company when preparing post-construction reclamation procedures for problem soils.

3.4.1 Site Selection

Site locations must be representative of soil conditions on the right of way. In choosing the sites, areas that are not typical of the right of way are to be avoided. Samples should be taken from a freshly dug soil pit or auger hole.

3.5 Laboratory Analyses

Analyses should be performed according to the Manual on Soil Sampling and Methods of Analysis (McKeague, ed. 1978). Table 3 lists analyses that should be performed on soil samples.

Table 1:

Visual Landform and Vegetation Characteristics

<u>Characteristic</u>	<u>Relationship to Pipelines</u>
1. Parent Material	- indicates potential for compaction, erosion and water holding capacity for revegetation.
2. Surface Features	- indicates areas such as sloughs, marshes. - indicates areas of adverse topography. - indicates variability of topsoil depths which may require changes in surface stripping procedures; e.g. knob and kettle topography.
3. Topography	- indicates potential for erosion. - determines grading requirements. - determines special equipment requirements. - determines special slope modification practices; e.g. drainage berms.
4. Surface and Subsurface Drainage	- indicates seep areas and slope discharge areas. - aids assessment of slope stability and whether soil drainage conditions will permit easy movement of vehicles along the right of way.
5. Land Use	- affects soil conservation and reclamation procedures.
6. Vegetation	- indicator of present soil capability.
7. Surface Salts	- indicator of problem soils, drainage problems.

Table 2:

Visual Soil Characteristics

<u>Characteristic</u>	<u>Relationship to Pipelines</u>
1. Depth of the major horizons (A, B & C to trench depth)	<ul style="list-style-type: none">- indicates depth of soil to be stripped and depth at which problem materials may occur.- assists in determining procedures and equipment for soil handling.- indicates storage space and location requirements, and right of way width requirements.
2. Colour	<ul style="list-style-type: none">- where colours are contrasting, differentiates between topsoil and subsoil horizons during surface stripping.
3. Texture and Structure	<ul style="list-style-type: none">- determines compaction potential, ease of handling and erodibility of major soil horizons.- used to differentiate between topsoil and subsoil horizons where colours are not contrasting.
4. Presence of Salts and Carbonates	<ul style="list-style-type: none">- indicators of problem soils.- indicates reclamation suitability of A and B horizons.- indicates whether separate storage and extra right of way width should be considered.- indicates revegetation species compatibility.
5. Stones and Bedrock	<ul style="list-style-type: none">- may influence soil handling procedures and reclamation practices.- may dictate use of certain types of construction equipment.

Table 3:

Soil Analyses

<u>Analysis</u>	<u>Relationship to Pipelines</u>
1. pH	<ul style="list-style-type: none">- indicates potential revegetation problems.- indicates fertility requirements in some cases.- indicates if salinity analyses may be required.
2. Salinity Analysis	<ul style="list-style-type: none">- confirms nature and severity of the problem.- confirms appropriate amendments and rates.- confirms appropriate methods and species for revegetation.

Analyze for:

Soluble Cations

(Na⁺, Ca²⁺, Mg²⁺, K⁺)

Saturation Percentage

(sat.%)

Sodium Adsorption Ratio

(SAR)

Electrical Conductivity

(E.C.)

4.0 REPORTING

4.1 The Map

Once soils have been inspected and characterized, the boundaries of segments of uniform or repeating soil and land features, indicating similar soil conservation procedures, are revised and delineated. Areas requiring special procedures are designated as separate segments. Final delineations should be presented on an air photo mosaic or, preferably, on the pipeline alignment sheet. Soil information and soil conservation procedures must be clearly indicated.

4.2 Legend

A legend should accompany the map and describe the map segments delineated to serve as a link between the map and the text (Fig. 1).

4.3 Text

The soil evaluation report must include an outline of methods used and a representative description of each soil segment encountered along the right of way. Major land uses, parent materials, general soil patterns and surface features should also be discussed.

The outline of methods used must include soil inspection density, sampling density, sampling techniques and laboratory analyses carried out. Various analyses performed should be indicated.

Each segment description should include:

- a description of landforms indicated in Table 1.
- a soil profile description using the Canadian System of Soil Classification (1978) format, and the information indicated in Table 2.
- results of any laboratory analysis.
- comments on depth of topsoil, degree of colour change, presence of salinity, sodicity or other problems and comments on any special stripping or construction procedures required.

A description of all profiles inspected and sampled should be included as an appendix to the report.

4.4 Soil Conservation Recommendations

The evaluation of soil and landform information is used to determine appropriate soil conservation procedures. The interpretations and recommendations for soil conservation must be done by individuals knowledgeable about pipeline construction and soils. This evaluation is essential to the preparation of an Environmental Protection Plan (EPP) and the procedures should be included as part of that plan. The proponent is responsible for the implementation of the EPP procedures during construction.

5.0 REFERENCES

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McKeague, J.A. ed. 1978. Manual on Soil Sampling and Methods of Analysis. Subcommittee on Methods and Analysis, Canada Soil Survey Committee. Canadian Society of Soil Science.

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6.0 GLOSSARY

arable land: Land presently used for, or capable of, cultivation.

electrical conductivity (E.C.): A measurement of the total concentration of dissolved salts, and therefore, the salinity of a soil. The reciprocal of the electrical resistivity.

exchangeable cation: A cation that is adsorbed on the exchange complex and which is capable of exchange with other cations.

landform: The shape of the land surface resulting from a variety of actions such as sedimentation, erosion and earth crust movements.

parent material: The unconsolidated and chemically weathered mineral material from which the soil has developed.

pH: The degree of acidity or alkalinity of a soil expressed in terms of the pH scale.

regulated pipeline: A pipeline that is 150 mm or more in diameter and 16 km or more in length.

salt-affected soil: Soil containing excessive concentrations of either soluble salts or exchangeable sodium, or both. Classified as saline, sodic or saline-sodic soil.

<u>Salt-affected Soil</u>	<u>Electrical Conductivity at 25 C (mmhos/cm)</u>	<u>pH</u>	<u>Sodium Adsorption Ratio</u>
Saline	> 4	< 8.5	< 12
Sodic	< 4	> 8.5	> 12
Saline-Sodic	> 4	< 8.5	> 12

saturation percentage: The total weight of water in a sample as a percentage of the oven-dry weight of a soil.

$$\text{sat.\%} = \frac{\text{wt. of water}}{\text{O.D. wt. of soil}} \times 100$$

sodium adsorption ratio (SAR): A ratio used to express the relative activity of sodium ions in exchange reactions with soil.

$$\text{SAR} = \frac{(\text{Na}^+)}{(\text{Ca}^{2+} + \text{Mg}^{2+})^2}$$

soil conservation: To maintain or preserve the natural quality of a soil's agricultural capability through appropriate soil conservation procedures.

soil consistence: The degree of cohesion or adhesion of the soil mass.

soil horizon: A layer of soil or soil material approximately parallel to the land surface which differs from adjacent layers in properties such as colour, structure, texture, consistency, and chemical, biological and mineralogical composition.

A horizon: A mineral horizon formed at or near the surface in the zone of removal of materials in solution and suspension, or maximum in situ accumulation or organic carbon, or both.

B horizon: A mineral horizon characterized by one of more of the following:

1. an enrichment in silicate clay, iron, aluminum or humus.
2. a prismatic or columnar structure that exhibits pronounced coatings or stainings associated with significant amounts of exchangeable sodium.
3. an alteration by hydrolysis, reduction, or oxidation to give a change in colour or structure from the horizons above or below, or both.

C horizon: A mineral horizon comparatively unaffected by the pedogenic processes operative in the A and B horizons, except gleying and the accumulation of carbonates and more soluble salts.

soil reclamation: To win back or restore a soil's agricultural capability through the use of post-construction procedures and amendments.

soil structure: The degree of aggregation of primary soil particles into compound particles that are separated from adjoining aggregates by surfaces of weakness.

soil subgroup: A category in the Canadian System of Soil Classification.

soil texture: The relative proportions of sand, silt and clay in soil.

soluble cations: The positively-charged soil constituents that are soluble in water.

subsoil: Those soil materials below the A horizon or below the layer (Ap) of soil disturbed by agricultural activity.

surface expression: The form (assemblage or shapes) and pattern of forms of genetic material (i.e. rolling, level, undulating, etc.).

topsoil: The A horizon in soils with horizonation, or the layer of soil moved in cultivation where no horizons are present.

APPENDIX C
ENVIRONMENTAL PROTECTION PLAN FORMAT AND IMPLEMENTATION

Suggestions for the preparation of Environmental Protection Plans (EPP) are outlined in the following sections.

A. FORMAT

SPECIFICATIONS

The EPP should clearly and concisely document the site-specific impacts and the proposed mitigative procedures. The following elements are necessary components.

Construction Schedule

- schedules the timing of the project and each separate activity to be undertaken.
- indicates pipeline in-service target date.

Right of Way Requirement

- indicates standard right of way width.
- locates areas where extra working space is required at road and other crossings for storage of soil materials.
- indicates areas of additional clearing when widening existing linear rights of way.

Contingency Plans

- describes plans to deal with non-controllable or inadvertent circumstances, such as wet weather, insufficient frost depth, forest fires, toxic substance spills or other potential emergencies.

Landowners Concerns and Notification

- includes the concerns of landowners and occupants regarding construction scheduling, topsoil stripping, livestock movements, irrigation, drainage, shelterbelt protection, extra soil cover, seeding and fertilizing.
- lists specific notification plans.

Inspection and Monitoring

- outlines plans for the inspection of construction activities to ensure compliance with documented EPP measures.
- includes planned procedures for monitoring the operation phases.
- identifies company contacts and includes their names, addresses and telephone numbers.

Environmental Protection Measures

- organized according to either:
 - a.) Relevant Pipeline Construction Activity
 - includes measures relevant to surveying, fences and gates, clearing, grading, trenching, hauling, stringing, bending, welding, coating, lowering-in backfilling, crossing of major

and minor water courses, testing, initial and final clean-ups,

or

b.) Management Unit or Environmental Specification Sheet

- documents measures according to land use and biophysical concerns such as forested lands, arable and pasture lands, irrigated lands, drainage systems, wetlands, erosion control units, water crossings, road and rail crossings and wildlife lands.

Annotated Drawings

- illustrates the detailed environmental protection measures to be implemented at sites indicated on the accompanying reference map.
- illustrates on typical design drawings, construction factors such as cross-sections of right of way widths, soil conservation procedures, general berm and breaker procedures or single sag creek crossings.
- illustrates with special design drawings, proposed treatments for environmentally sensitive locations such as sidehills or significant water crossings. In the case of sidehill conditions, the drawing illustrates the required extra working space, grading requirements, spoil storage, final grade, berm and breaker spacing and special revegetation methods. Included in the drawings for significant water bridges or other construction access, flume pipe placement and stream-bank restoration.

REFERENCE MAPS

An EPP is incomplete without a reference map. Two reference map formats which use construction alignment sheets as the base are illustrated on Figures 1 and 2. Use of aerial photo mosaics is acceptable where alignment sheets are unavailable. The two formats are by no means the only acceptable presentations. Any method which clearly depicts environmental protection measures and is easily interpreted by construction personnel is acceptable.

Attention to the following details will ensure mapping adequacy and assist in field interpretation of the maps by construction personnel.

Map Base

- identify and locate environmental protection information.
- utilize construction alignment sheets when available.
- use aerial photo mosaics when alignment sheets are unavailable.
- indicate topography on a route profile where it is a major environmental concern; berm and breaker placement may also be shown on the route profile.

Scale

- is of concern if alignment sheets are not used.
- may vary from 1:10,000 to 1:50,000 depending upon the pipeline length and the site specific environmental sensitivity.
- requirement for portraying details such as water crossing is 1:5,000 to 1:10,000, as appropriate.

Environmental Description

- is indicated clearly, but with a minimum of detail.

B. IMPLEMENTATION

The EPP protects the environment only if it is implemented. Implementation is facilitated when project requirements are clear and are fully understood by all parties concerned with construction. The proponent can take a number of steps to encourage implementation of the EPP during the construction and operation stages.

Ground Truthing

- surveyors may be encouraged to make slight adjustments to the route to avoid unnecessary disturbance, reclamation problems and landowner conflicts, such as those caused by sidehills, shelterbelts or water crossing approaches.
- walking of particularly sensitive sections results in identification of specific concerns and the appropriate protection measures. Locations are marked with survey stakes or flags.

Contractual Agreements

- incorporation of the EPP into the construction specifications and onto the alignment sheets helps accurate bidding and contracting.
- inclusion of the EPP or of the summarized environmental protection measures in the "Scope of Work" is useful.

Construction Kickoff Meetings

- introduction of proponent, contractor, and government personnel to establish good communication and to foster good field relations.
- discussion of environmental issues and protection measures relevant to the project.

Construction Inspection

- inspection by company personnel assists in the implementation of environmental protection measures.
- inspection by company environmental officers assists in the appropriate treatment of sensitive areas.
- approval of EPP changes due to unanticipated conditions is obtained from government field staff before implementation.

Environmental Monitoring

- monitoring of selected environmental protection measures, such as creek fluming, may be useful in verifying actual impacts.
- preparation of an As-Built Environmental Report is required in some instances, by the Chairman of the Land Conservation and Reclamation Council, to address specific environmental problems or procedures.

Post-Construction Monitoring

- identifies post-construction environmental or reclamation problems such as erosion, slope failure, trench settlement or poor seed catch.
- ensures implementation of remedial measures.

APPENDIX D
POTENTIAL APPROVALS FOR PIPELINE DEVELOPMENT

<u>Approvals</u>	<u>Issuing Agency</u>	<u>Phone</u>
Permit to Construct	Energy Resources Conservation Board	297-8146
Development and Reclamation Approval	Alberta Environment	427-6323
Ministerial Approval	Alberta Environment	427-6323
Ministerial Consent	Alberta Environment	427-6208
Surface Rights for Public Lands - Pipeline Agreements (PLA) - Pipeline Installation Lease - Right of Entry (ROE) - Other Permits and Leases as required.	Alberta Forestry, Lands and Wildlife	427-3570
Water Resources - Licence to Divert - Permit to construct near or across a watercourse	Alberta Environment	427-6168
Road or Rail Crossing Permit	Alberta Transportation, and Utilities Municipality, Canadian National Railways, Canadian Pacific Railways	427-7071
Road Use Permits	Leaseholder, Municipality	
Historical Resources Permit	Alberta Culture	427-2355
Clean Air Permit	Alberta Environment	427-5872
Clean Water Permit	Alberta Environment	427-5888
Navigational Waters Approval	Transport Canada	604-984-3730
Herbicides Permit	Alberta Environment	427-5855
Burning Permit	Alberta Forestry, Lands and Wildlife	Local Forestry Office

Approvals**Issuing Agency****Phone****Permission to Blast
(for watercourses)****Alberta Forestry,
Lands and Wildlife****Local
Fish &
Wildlife
Office****Reclamation Certificate****Alberta Environment or
Alberta Forestry,
Lands and Wildlife****427-6212
427-3583****Trapper Compensation Review Plan****Alberta Forestry,
Lands and Wildlife****427-6750**

Not all the approvals noted in this section are required for a specific pipeline project. This list also does not contain approvals that may be required at the local municipal government level.