

PARAMOUNT TRANSMISSION LTD.

4700 Bankers Hall West
888 - 3rd Street SW
Calgary, Alberta
T2P 5C5

Telephone: (403) 290-3600

Fax: (403) 266-.6032

NEB File 3400-P097-1

February 21, 2002

National Energy Board
444 Seventh Avenue SW
Calgary, Alberta
T2P 0X8

Attention: Mr. Michel Mantha

Dear Sir;

**Re: Paramount Transmission Ltd. Cameron Hills Pipeline and Fuel Gas Pipeline, Order
XO-P097-02-2002; Condition 8 and 18: Revegetation and Permafrost Monitoring
Plans**

As required by conditions 8 and 18 of the above National Energy Board (NEB) order, Paramount Transmission Ltd. (PTL) hereby files with the NEB the Right-of-way Revegetation and Permafrost Monitoring Plan.

If there are questions regarding the above matter then please contact the undersigned at (403) 290-3696.

Yours truly,

PARAMOUNT TRANSMISSION LTD.

Tom Hong, Project Manager

Attachments

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DISTRIBUTION LIST

Government of Northwest Territories
Resources, Wildlife & Economic Development
6th Floor, Scotia Centre
P.O. Box 1320
Yellowknife, NT

Attention: Mr. Brett Hudson

Mackenzie Valley Land & Water Board
P.O. Box 2130
Yellowknife, NT
X1A 2P6

Attention: Mr. Janpeter Lennie-Misgeld

Environment Canada
Environmental Protection Branch
Suite 301, 5204 – 50th Avenue
Yellowknife, NT

Attention: Ms. Anne Wilson

Deh Gah Got'ie Dene First Nation
General Delivery
Fort Providence, NT
X0E 0L0

Attention: Chief Sam Gargan

K'atodeeche First Nation
Box 3060
Hay River Reserve, NT
X0E 1G4

Attention: Chief Pat Martel

Fax: 1-867-874-3229

Fort Providence Metis Nation
General Delivery
Fort Providence, NT
X0E 0L0

Attention: President Albert Lafferty

Fax: 1-867-699-3210

West Point First Nation
1, 47031 Mackenzie Highway
Hay River, NT
X0E 0R9

Attention: Chief Karen Thomas

Fax: 1-867-874-2486

Mandell Pinder
Barristers & Solicitors
500 – 1080 Mainland St.
Vancouver, BC
V6B 2T4

Attention: Ms. Constance Macintosh

Ka'a'gee Tu First Nation
Box 4428
Hay River, NT
X0E 1G3

Fax: 867-825-2002

**PARAMOUNT RESOURCES LTD.
CAMERON HILLS GATHERING SYSTEM AND
TRANSBORDER PIPELINE**

**RIGHT-OF-WAY REVEGETATION
&
PERMAFROST MONITORING PLAN**

Prepared By:

**Paramount Resources Ltd.
and Golder Associates Ltd.
4700 Bankers Hall West
888 Third Street S.W.
Calgary, Alberta
T2P 5C5**

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Table 1: Abbreviations and Acronyms

COGOA	Canada Oil and Gas Operations Act
EA	Environmental Assessment
EC	Environment Canada
GNWT	Government of the Northwest Territories
GPS	Global Positioning System
MVEIRB	Mackenzie Valley Environmental Impact Review Board
MVLWB	Mackenzie Valley Land and Water Board
NEB	National Energy Board
NWT	Northwest Territories
Paramount	Paramount Resources Ltd.
PTL	Paramount Transmission Ltd.
ROW	Right-of-Way

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1. INTRODUCTION

The Mackenzie Valley Environmental Impact Review Board (MVEIRB) and the National Energy Board (NEB) granted approvals to Paramount Resources Ltd. (Paramount) for construction of a gathering system in the Cameron Hills, NWT, and a transborder pipeline from Cameron Hills, south into northwestern Alberta. The environmental assessment (EA) for the projects was performed by the MVEIRB and the NEB.

This document describes the methods Paramount plans to undertake to ensure the commitments to EA measures 3 (Revegetation planning), 4 (Revegetation monitoring) and 18 (Permafrost monitoring) in their report on Environmental Assessment on the Paramount Resources Ltd. Cameron Hills Gathering System and Pipeline Development are addressed. These measures as well as their associated NEB and MVLWB conditions are provided below:

MVEIRB EA Measures

Measure #3: The MVLWB and/or the NEB ensure that Paramount consults with the GNWT to develop revegetation plans for areas that require remedial action. These plans should be filed with the GNWT, the MVLWB and the NEB.

Measure #4: The MVLWB and/or NEB ensure that Paramount be required to develop and implement a follow-up monitoring program to assess the vegetation recovery in both seeded and unseeded areas. Paramount should periodically produce a report that compares the presence and relative abundance of indigenous and non-indigenous species in the seeded areas versus the unseeded areas. This report should be provided to the local First Nations, the GNWT, the MVLWB and the NEB.

Measure #18: The MVLWB and/or the NEB ensure that Paramount identifies and monitors locations where permafrost is encountered. Paramount is to periodically produce a report and submit it to the GNWT, the MVLWB and the NEB.

MVLWB Land Use Permit MV200P0055

Condition 66: When seeding is done the Permittee will use Certified Canada #1 seed and the appropriate seed certificates will be made available to an Inspector.

Condition 69: The Permittee shall develop a re-vegetation plan for areas that require remedial action in consultation with the GNWT and these plans will be submitted to the MVLWB, NEB and GNWT.

Condition 70: The Permittee shall develop and implement, a re-vegetation monitoring program to assess;

- a) vegetation recovery in both seeded and unseeded areas of disturbance.*
- b) Composition of indigenous and non-indigenous species in seeded areas compared to unseeded areas.*
- c) The proposed monitoring program will be submitted to the Board for approval within one hundred twenty (120) days of project commencement.*

Condition 81: The Permittee shall submit to the Board and the GNWT:

- a) Within six months of project commencement - Report documenting and describing each permafrost location encountered, including, depth, extent, terrain, vegetation re-establishment and heat effects to soils and vegetation.*

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- b) *Annually, by October 1st - Report documenting results of permafrost monitoring which will include, depth, extent, terrain, vegetation re-establishment, thaw settlement, trench subsidence, evidence of floating pipe, vegetation re-establishment, and heat effects to soils and vegetation.*

NEB Section 58 Order XO-P097-02-2002

Condition #8: PTL shall file with the Board for approval at least 14 days prior to the commencement of reclamation activities, its proposed seed mixtures and a monitoring plan to assess the growth and species composition of vegetation on seeded areas. The plan shall be developed in consultation with the Government of Northwest Territories (GNWT), Environment Canada and the Local aboriginal communities, where appropriate.

Condition #18: PTL shall file with the Board

- a) *within six months after the commencement of operation a report identifying and describing each permafrost location encountered, including depth, extent, terrain, vegetation, and mitigation implemented, and*
- b) *on an annual basis for a period of five (5) years following construction, report containing the results of monitoring at each permafrost location identified that includes slope stability, trench subsidence, evidence of floating pipe, vegetation re-establishment and heat effects to vegetation composition.*

Condition #20(c): PTL shall file with the Board for approval within six months following the completion of construction and on an annual basis for five years following construction, a report: [(a) and (b) omitted]... (c) describing the results of PTL's assessment of the establishment of vegetation cover on areas disturbed during construction.

NEB Section 5(1)(b) of COGOA Order EPO-01-2002

Condition #9: Paramount shall file with the NEB, at least 14 days prior to the commencement of reclamation activities unless otherwise directed by the Chief Conservation Officer, its proposed seed mixtures and revegetation plan and confirmation that it will be implemented. The plan shall be developed there appropriate in consultation with the MVLWB and Government of the Northwest Territories.

Condition #14: Paramount shall file with the NEB, as appropriate

- a) *within six months after the commencement of operation a report identifying and describing each permafrost location encountered, including depth, extent, terrain, vegetation and mitigation implemented, and*
- b) *on an annual basis for a period of five years following construction, a report containing the results of monitoring at each of the permafrost locations that includes slope stability, trench subsistence, evidence of floating pipe, vegetation re-establishment and heat effects to vegetation composition.*

Condition #16(c): Paramount shall file with the NEB within six months following the completions of construction and on an annual basis for five years following construction, a report: [(a) and (b) omitted] ... (c) describing the results of Paramounts assessment of the establishment of vegetation cover on areas disturbed during construction.

2. REVEGETATION PLAN

A suitable supply of endemic seed species is seldom available in commercial quantities. Most often, seed that is available in sufficient quantities is highly competitive, non-indigenous agronomic species. Use of these species may result in significant competition to regenerating and recolonising native flora, especially in the early seral stages of secondary succession. Consequently, to maintain the ecological integrity of the project area, it is planned that only the disturbed sites that are susceptible to erosion (e.g., steep slopes leading down to drainage) be seeded.

Revegetation through natural regeneration of existing propagules within the seed bank, and encroachment from adjacent native communities will be utilised on disturbed ROW areas not required for operations. The Paramount Inspector will identify areas to be seeded and not seeded during construction based on the evaluation of slope and erosion-prone areas.

The seed mixture outlined in the EIA (Paramount et al. 2001) will be sowed at 10 kg/ha using a rotary broadcaster mounted on the back of a truck, a quad or with a hand held spreader as required.

Seed Species	%
Regreen wheat x wheatgrass	15
Awed wheatgrass	25
Fall Rye	50
Slender Wheatgrass	10
Total	100

To ensure germination and seed placement are not effected, seeding will be completed following stabilisation of the ROW (through the placement of berms and slash) when potential disturbances from reclamation procedures are at a minimum.

3. REVEGETATION MONITORING

To address EA measure #4, Paramount plans to conduct an annual vegetation-monitoring program for five years as outlined below. A request to shorten this time frame may be made if a trend is established or adequate data is accumulated. Paramount is currently utilising this technique on other pipeline projects in the NWT.

The objectives of the program would be to compare natural revegetation of a sloped area within the ROW, to the revegetation on a seeded, sloped area within the ROW. The investigation would provide information on the germination success of the seed mixture, identify any competition issues between the seeded species and native vegetation species, and, any benefits (e.g., erosion control) or concerns (e.g., attracting wildlife) that could be attributed to the introduced vegetation cover.

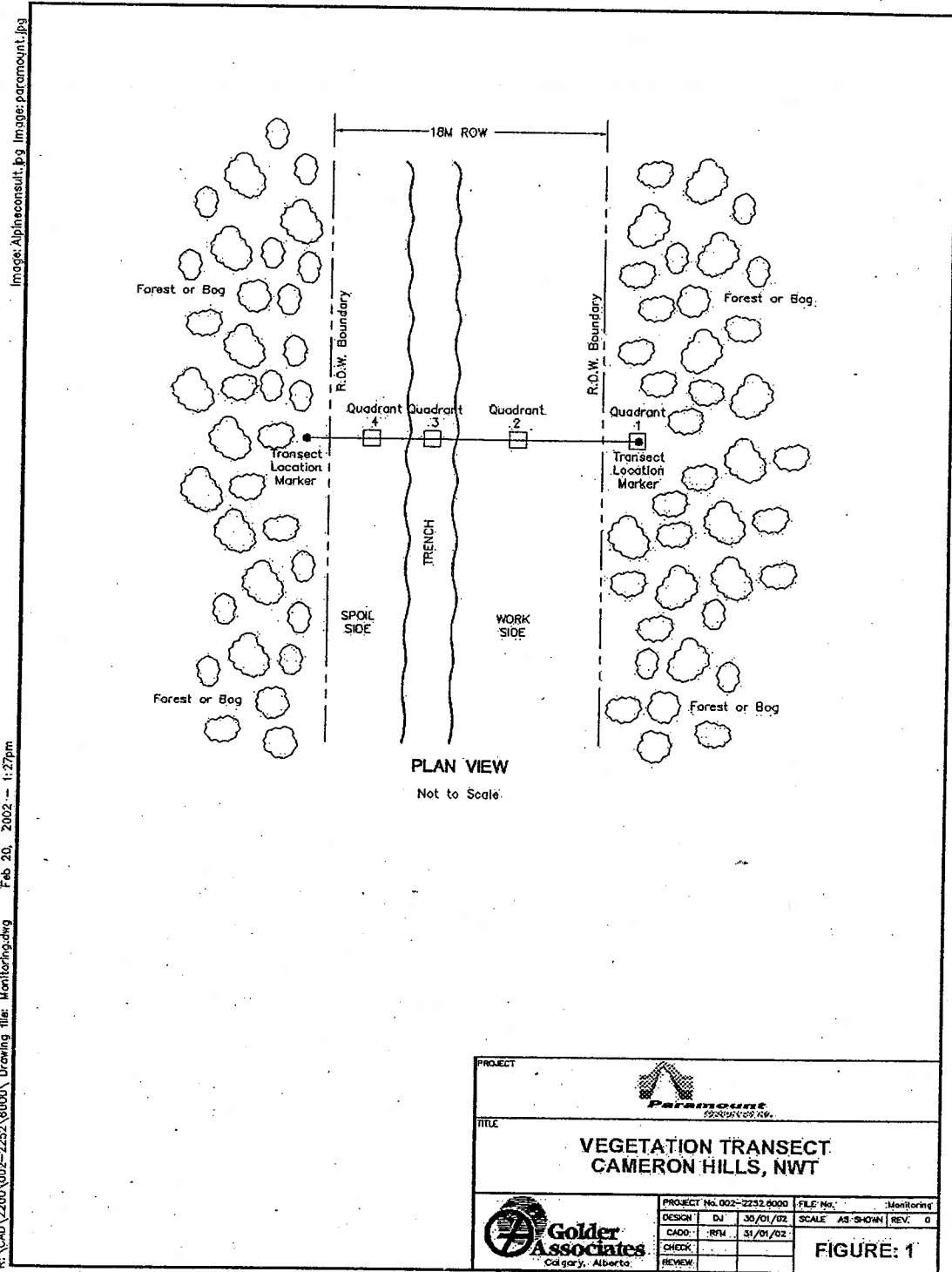
Paramount plans to establish six transects representative of slope and seed treatment. Three of these transects would be located on reseeded slopes, likely, but not necessarily, leading down into active watercourses (i.e., erosion control to prevent siltation of the watercourse). The remaining three transects would be located on similarly sloped portions of the ROW that were not seeded, but allowed to revegetate naturally by encroachment of native species adjacent to the ROW. Transect locations will be finalised after a reconnaissance of the completed ROW and when the slopes requiring seeding have been determined.

On each of the six transects four quadrats will be established across the ROW, with each measuring 1 metre square. One quadrat will be established within the natural vegetation adjacent to the ROW (for background), one in the middle of the spoil side, one centred over the trenchline and one in the middle of the workside (see attached Figure 1). This approach is designed to evaluate the different types and levels of disturbance to each of these areas, and subsequently, the revegetation patterns.

It is important to ensure accurate relocation of transects and quadrats from year to year so that direct comparisons and data analyses can be completed. As such, all locations will be properly recorded and marked. The endpoints of each transect across the ROW and the centre of each quadrat will be located using a GPS unit. Two bands of survey ribbon will be attached to permanent vegetation at breast height on the endpoints of each transect adjacent to the ROW. In addition, wooden hub stakes will be placed in the ground at the ends of each transect and all measurements will be relative to these wooden hub stakes. Low wooden hub stakes will also be placed in the top right corner of each quadrat. All locators will be inspected and repaired each year (as needed).

A team consisting of up to two biologists, two First Nations' assistants and a representative from Paramount will complete the vegetation survey (the latter two will be dependent on availability).

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Data to be recorded from each transect includes:

- Date;
- Location;
- Transect identification number;
- Distance to watercourse (if applicable);
- Slope %;
- Aspect;
- Habitat type;
- Weather conditions;
- Evidence of erosion, ponding or subsidence; and
- Photographs of the transect.

Data to be recorded from each quadrat includes:

- Date;
- Transect number;
- Quadrat location identification;
- Vegetation species present;
- Percent cover for each vegetation species (includes litter and bare ground);
- Health, vigour and height of the vegetation;
- Growth restrictions (e.g., erosion, compaction, ponding subsidence); and,
- An overhead photograph of each quadrat.

During the field assessment, records (i.e. written and photographic) would be kept of any other observations that may be relevant to reclamation and revegetation such as sign of erosion, settling, ponding etc. These observations would not be confined to the transects, but also other areas on the ROW. Records will also be kept of any relevant sightings such as wildlife sign or observations.

The data collected from the quadrats and transects would be compared with statistical analyses, such as analysis of variance (ANOVA) to determine differences in revegetation patterns between the seeded and unseeded slopes. Paramount will produce a brief, annual report that will be submitted to the GNWT, MVLWB, EC, NEB and local aboriginal communities.

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4. PERMAFROST MONITORING

To compare physical changes in permafrost areas crossed by the ROW in compliance with environmental assessment measure #18, Paramount plans to conduct an annual permafrost survey for five years, as outlined below, unless a trend is established or data collection is deemed adequate. At such time, Paramount would request relief from further monitoring. As no control locations exist, only qualitative conclusions and direct observations will be provided.

The objectives of the permafrost monitoring, is to qualitatively describe changes to the ROW (e.g., subsidence, ponding) resulting from changes to permafrost under the ROW, over time.

Permafrost areas have been noted along the ROW, and have been mapped. The Paramount construction inspector will confirm the presence of permafrost areas at the time of trenching. GPS waypoints will be taken at the start and end of the identified permafrost locations to delineate the extent, and allow easy location during subsequent examinations.

Within six months after commencement of operations, a report identifying and describing permafrost location, depth, extent, terrain, vegetation reestablishment, implemented mitigation measures and heat effects to soils and vegetation will be prepared and submitted to the NEB, the MVLWB, EC and the GNWT.

On an annual basis thereafter and before October 1, a brief report containing monitoring observations for each permafrost location will be prepared and submitted to the GNWT, the MVLWB, EC and the NEB. This report will contain observations on depth, extent, terrain, slope stability, thaw settlement, trench subsistence, evidence of floating pipe, vegetation re-establishment and heat effects to soils and vegetation composition.

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5. SCHEDULE

Both programs, the revegetation monitoring and the permafrost monitoring, will be conducted annually in August or early September, to allow vegetation growth during the summer season.

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6. REFERENCES

Golder Associates Ltd. January 17, 2002. Response to Final Approved Measures. Letter to Paramount Resources Ltd. Project 002-2252.

Mackenzie Valley Environmental Impact Review Board (MVEIRB). 2001. Report of Environmental Assessment on the Paramount Resources Ltd. Cameron Hills Gathering System and Pipeline Development - Final Approved Measures.

Mackenzie Valley Land and Water Board (MVLWB). January 17, 2002. Issuance of Type "A" Land Use Permit: Conditions Annexed to and Forming Part of Land Use Permit Number MV2000P005. Letter to Ms. Shirley Maaskant of Paramount Resources Ltd. File: MV200P0055.

National Energy Board (NEB). January 22, 2002. Paramount Transmission Ltd. (PTL) Cameron Hills Pipeline and Fuel Gas Pipeline (Cameron Hills Pipeline) Application Pursuant to Section 58 of the National Energy Board Act (the NEB Act). Letter to Mr. Alan Hollingworth of Gowling Lafleur Henderson. File 3400-P097-1.

National Energy Board (NEB). January 30, 2002. Paramount Resources Ltd. (Paramount) Application to Construct the Cameron Hills Oil and Gas Development Project dated 1 August 2001 pursuant to Paragraph 5(1)(b) of the Canada Oil and Gas Operations Act (COGOA). Letter to Mr. Tom Hong of Paramount Resources Ltd. File 2520-D-4-4.

Paramount Resources Ltd., Golder Associates Ltd., and Alpine Environmental Consulting Ltd. 2001. Environmental Impact Assessment for the Cameron Hills Transborder Pipeline Project. Submitted to the National Energy Board. June 2001. 117 pp + figures.