

Environmental Assessment

Draft Terms of Reference

for the

Paramount Resources Ltd.

Cameron Hills Drilling Project

December 19, 2000

Issued by:

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1 INTRODUCTION

The purpose of these terms of reference is to provide the framework for the environmental assessment that will be undertaken for the Paramount Resources Ltd. Cameron Hills Drilling Project. The Mackenzie Valley Environmental Impact Review Board (Review Board) is required by s.126 of the Mackenzie Valley Resource Management Act (MVRMA) to conduct an EA of the development. This project was referred to the Review Board by the South Mackenzie Panel (SMP) of the MVLWB which concluded that the development activities “might have a significant environmental impact” mostly with respect to flaring (see chronology below).

In preparing these terms of reference the Review Board took into account its mandate as stated in sections 114, 115, 117 and 128 of the MVRMA. The Review Board also considered previous assessment reports (s.127) as they may relate to the development proposal before them. The Review Board was also mindful of the scale and size of the development being proposed.

Chronology of events:

On August 29, 2000, the Mackenzie Valley Land and Water Board (MVLWB) received Paramount Resources Ltd.’s applications for a Type ‘A’ Land Use Permit (Application #MV2000A0041) and a Type ‘B’ Water License (Application #MV2000L1-0009) to undertake the Cameron Hills Drilling Project.

The applications and supporting documentation were circulated to federal and territorial government departments, First Nations organizations and municipal governments. The comments received were taken into consideration by the MVLWB staff when they completed the preliminary screening on the development.

On November 20, 2000, the MVLWB referred the development proposal to the Review Board, in accordance with ss.126(1) of the MVRMA, citing the following reasons for the referral:

- Exact quantities of H₂S (hydrogen sulfide) and SO₂ (sulfur dioxide) that would be released into the atmosphere as a result of incomplete combustion or venting of gases from this development proposal are unknown.
- The potential for deposition of waste from noncombusted gases released from flaring/venting operations in relation to the project area and proposed operations were not documented.
- The scope of the proposed development did not document when flaring or venting would be required and with what frequency.
- The application did not outline what the maximum allowable limits of H₂S and SO₂ emissions would be as a result of flaring activities.
- Levels of all other contaminants that can be released into and potentially contaminate the environment from project flaring or venting operations are unknown.

2 SCOPE OF THE DEVELOPMENT

The Review Board is required to provide a scope of development determination according to ss.117(1) of the MVRMA. This section describes what the Review Board considers the scope of the drilling program.

2.1 *Principal Development*

The development is located on the plateau of the Cameron Hills in the Northwest Territories, about 75 km southwest of Enterprise, NWT and immediately north of the Alberta/NWT border.

The principal development activities are:

- Drill, complete and test 9 new wells. Each well location will be cleared and graded as required to a maximum size of 110 m by 110 m. Access to the well sites will be through existing cut-lines where possible although some new access routes will have to be constructed. The testing will involve the flaring of natural gas.
- Complete and test 7 existing wells. No clearing or grading will be required for the existing well sites with the exception of a turn-around area at the well-head. The testing will involve the flaring of natural gas.
- Drill up to 10 additional wells in the area over the next seven years conditional on prior drilling success. The locations of these possible future wells are unknown at this time.

The drilling, completing and testing of wells involves the tasks listed in Table 1.

Table 1 – Well Drilling, Completing and Testing Activities

Move in and set up drilling equipment
Drill well
Move out drilling equipment
Wait for service rig to be available
Move in service rig
Conduct wellbore operations to prepare it for perforation
Perforate the zone of interest
Run a static gradient to acquire initial parameters
Stimulate the zone
Move out service rig
Initial flow back of gas and stimulation fluids to clean up the zone to allow for accurate evaluation of the zone.
Run electronic recorders into the well to conduct an evaluation of the reservoir through production testing of the well.

Flow test the well to determine economics of project development by evaluating reservoir parameters including:

- Permeability
- Effectiveness of wellbore stimulation
- Well deliverability
- Potential reservoir size

The length of the production test is determined by:

- Threshold reserves required for the project development; and
- Any declining performance seen during production testing.

Shut in the well to acquire pressure build-up information

Pull recorders and install suspension plug

Wait for pipeline to be built to enable well to go on production.

Source: Paramount Resources Ltd.

The list of activities in Table 1 was compiled with the assistance of, and with information provided by, Paramount Resources Ltd.

2.2 Accessory Developments and Activities

The completion of the principal activities requires additional developments and activities to be undertaken. These include the following:

- Re-use a temporary winter access road, approximately 33 km in length, from Indian Brook, Alberta on Highway 35, to a point approximately 10 km into the NWT. This winter road access will follow the same alignment as the winter road previously permitted and used in the 1999-2000 winter season.
- Air access will be via a temporary winter airstrip equipped with lights and a radio beacon.
- Construct three ice bridges: two on the Cameron River and one on a tributary of the Cameron River. Other water crossings will be over streams that are expected to freeze to the bottom.
- Construct up to six temporary 20 man camps. The camp locations will take advantage of previous camp or airstrip locations. Water for the camps may come from an existing well or new wells will be drilled at each camp location.
- Obtain drilling water from a specific unnamed lake near the well sites and, if required, from the water wells.
- Dispose of drill wastes in two remote sumps. Some clearing and leveling will be required around the sumps.
- Use an existing borrow pit. Soil excavated from the borrow pit will be used during the closure of the drilling fluid and sewage sumps using the mix, bury and cover method.
- May require access to any of their other existing wells.

The well drilling, well completions, well testing and camp operations will occur within an area delineated as follows: on the north by latitude $60^{\circ} 20'$, on the south by latitude $60^{\circ} 00'$, on the east by longitude $117^{\circ} 15'$, and on the west by longitude $117^{\circ} 50'$.

3 SCOPE OF THE ASSESSMENT

In preparing the scope of the assessment, the Review Board first undertook a Preliminary Conformity Check against para. 117(2)(a) requirements to determine what had already been covered off and, with the exception of flaring and venting issues and cumulative impacts, other potential environmental and socio-economic impacts of the development have been appropriately covered for the purposes of proceeding with the environmental assessment though additional information may be sought through the Information Request (IR) process.

Based on the Preliminary Conformity Check (Appendix A), Review Board staff recommended to the Review Board that the developer's *Environmental Screening Report for the Cameron Hills Drilling Project*, be accepted as the environmental assessment report plus any additional information that will be prepared by the developer based on these terms of reference or through Information Requests. On December 7, 2000, the Review Board accepted the staff suggestion. Other Review Board instructions to the staff included:

- Prepare a draft work plan and draft terms of reference (ToR) based on the acceptance of the environmental screening report as the EA report. Distribute these documents to regulators, government, First Nations and the public and other interested parties for feed-back on this approach.
- Flaring and venting issues should be prominently addressed in the ToR and the EA report. As the environmental screening report is insufficient in the area of flaring and venting issues, use an Information Request to get the developer to provide more extensive and detailed information to conform with the ToR.
- Advise the developer to continue to closely consult and inform the affected communities to mitigate socio-economic and traditional land use impacts.

After considering the available documentation and the Preliminary Conformity Check, the Review Board has prepared these draft EA Terms of Reference consistent with these findings and is seeking public comment on:

- the approach the Review Board has taken to the completion of this EA;
- the directions to the developer listed in these ToR;
- any other part of these ToR.

Any comments received will be taken into consideration by the Review Board during its preparation of the final Terms of Reference for this environmental assessment.

4 ADDITIONAL ENVIRONMENTAL ASSESSMENT INFORMATION

This section provides direction to Paramount about the additional information still required by the Review Board and its advisors in order to make an EA decision. In responding to these additional information requirements, Paramount will be advised to provide the information consistent with the direction provided under Scope of Development and Scope of Assessment. The Review Board may also request Paramount and others to respond to Information Requests from other parties in the EA process.

4.1 Direction to Paramount

The Review Board requests the following information from Paramount regarding the proposed development. Paramount should provide a clear rationale for statements made, conclusions reached and intended courses of actions to be followed in carrying out the development.

4.1.1 Developer Identification and Performance Record

Paramount shall provide the following;

- the name of company representatives managing the proposed development;
- company incorporation and structure information;
- the company's corporate history in Canada and the Northwest Territories, and that of its partners, if any;
- the proposed development ownership
- an organizational structure identifying corporate and individual responsibilities for the development and operations, and
- an environmental performance record at the current site.

4.1.2 Tenure

Paramount shall clearly delineate, using appropriate mapping, the surface interests that the company intends to secure through the Land Use Permit and/or other tenure arrangements for the proposed development.

4.1.3 Regulatory Regime

Paramount shall provide a table summarizing relevant licenses, permits and other authorizations that are required, or require amendment to allow the proposed development to occur. This should include, for reference purposes, existing permits and other authorizations that remain in force, and do not require amendment to allow the proposed development to occur, and their respective durations.

4.1.4 Accidents and Malfunctions

Paramount shall identify the probability of accidents and/or malfunctions occurring related to the proposed development including, but not limited to, fuel and other hazardous material spills. The potential magnitudes of, and contingencies to deal with, these accidents and/or malfunctions should also be discussed.

4.1.5 Consultation

Paramount shall summarize consultations undertaken with the affected municipalities, First Nations organizations, government etc. indicating how any concerns raised have been addressed.

4.1.6 Alternatives

Paramount shall provide an explanation of the alternatives to the principal and accessory parts of the development. For example, what are the alternatives to and justifications for requiring well clearings to have a maximum size of 110 m x 110 m? Can these clearing sizes be reduced? Another question that could be asked is "What are the alternatives to and justifications for using up to 6 camp sites?". Can or should the number of camps be reduced?

4.1.7 Air Quality and Climate

An analysis should be undertaken to determine the possible impacts of the proposed development on air quality. All well test flaring must comply with the NWT one-hour air quality standard for sulphur dioxide (450 µg/m³). The analysis shall include:

1. Provide reports from preliminary sampling that estimates gas composition. What is the hydrogen sulphide and the carbon dioxide content of the gas? Provide an estimate of the emission rates of hydrogen sulphide, sulphur dioxide, carbon dioxide and volatile organics.
2. Provide details about the equipment that will be used for the test burn including the flare stack size, stack combustion efficiency and the anticipated gas flow rates during tests including the maximum rates. Describe the efficiency of flare combustion under various stable and unstable meteorological conditions.
3. Discuss the potential accidental releases or venting of unburned gases and describe steps that will be used to prevent these releases.
4. Discuss the meteorology and climatology of the area including parameters that would affect the dispersal of pollutants such as wind speed, wind direction and atmospheric stability. Describe efforts to obtain the representative meteorological data that would be needed for dispersion modelling of air emissions in a complex terrain.
5. Conduct dispersion modelling in compliance with recognized guidelines such as the Alberta Energy and Utilities Board Guide 60.
6. Discuss baseline air quality conditions including a discussion of emissions from other existing and proposed sources within the region.
7. Discuss ambient ground-level concentrations of sulphur dioxide and hydrogen sulphide that could result during the well tests.
8. Assess the impacts of flaring activities on wildlife including vegetation and migratory birds as well as any impacts on surrounding surface water quality. This impact assessment should:
 - identify the development activity;
 - identify the potential impacts of this activity (along with any supporting evidence);
 - propose mitigative measures (along with evidence that the mitigative measures will work); and
 - predict residual impacts that cannot be mitigated.
9. A discussion of efforts taken to minimize the release of any air contaminants and to mitigate the impacts

of any emissions.

4.1.8 Cumulative Impacts

Paramount shall review their cumulative effects assessment and up-date it (Ch. 8, *Environmental Screening Report for the Cameron Hills Project*), as required, to include Paramount's proposed seismic program in the Cameron Hills.

Paramount shall analyze and report on the cumulative impacts where impacts on biological receptors such as vegetation and wildlife are identified as a result of production testing (flaring) and/or venting. This assessment should cover the same criteria listed in Section 4.1.7 (8).

When addressing cumulative impacts, Paramount should consult the document *Addressing Cumulative Environmental Effects in Environmental Assessment under the Mackenzie Valley Resource Management Act* (Interim Guide, September 2000) which was prepared by the Review Board.

4.2 Direction to Others

The Review Board may also request information from government bodies, expert advisors or others through the issuance of Information Requests (IR's). Information requested and received through the IR process would assist the Review Board in completing the EA and reaching an EA decision.

Parties receiving an IR should meet the criteria listed in Section 4.1.7 (8). With an anticipated EA decision date of late February, all responses to IR's and any other information parties wish to provide to the Review Board should be submitted as soon as possible, and certainly before the closure of the public registry.

5 EA DECISION PROCESS

When the public registry has closed for this EA, the Review Board will consider all of the evidence received and reach an EA decision in accordance with ss.128(1) of the MVRMA. Once the Review Board has made a decision and provided its written reasons, the Review Board's Report of EA, made in accordance with ss.128(2), will be forwarded to the federal Minister of DIAND for his decision in accordance with s.130. As this development also involves a DRA (i.e., the NEB), the Review Board's Report of EA will also be forwarded to the NEB for its decision in accordance with s.131.

Appendix A

Preliminary Conformity Check Checklist for the Cameron Hills Drilling Project

PHYSICAL - CHEMICAL EFFECTS

DISCUSSION

1. Ground Water

☒ water table alteration

Withdrawal from water wells will be at a rate to protect well integrity.

☐ water quality changes

☐ infiltration changes

☐ other: _____

☐ N/A

2. Surface Water

☒ flow or level changes

Water usage from the source lake will be staggered and, if required, supplemented by water wells.

☒ water quality changes

Possible impacts due to deposition of ash from flaring and venting operations has not been examined.

☐ water quantity changes

☒ drainage pattern changes

Potential impacts identified

☐ temperature

☐ wetland changes / loss

☐ other: _____

☐ N/A

3. Noise

☒ noise increase

Possible short-term temporary impacts on wildlife due to noise increase in the immediate area of the development.

☒ noise in/near water

☒ other: _____

☒ N/A

4. Land

☒ geologic structure changes

X soil contamination Potential impacts identified

☒ buffer zone loss

X soil compaction & settling Potential impacts identified

X destabilization / erosion Potential impacts identified

X permafrost regime alteration Potential impacts identified

☒ other: _____

☒ N/A

5. Non Renewable Natural Resources

X resource depletion Minimal loss of petroleum resources through flaring and venting operations.

☒ other: _____

☒ N/A

6. Air / Climate / Atmosphere

X Vehicle and equipment emissions Potential impacts identified

X Flaring and venting emissions Additional research required to determine potential impacts due to flaring and venting operations.

☒ N/A

BIOLOGICAL ENVIRONMENT

1. Vegetation

☒ species composition

☒ species introduction

Seed mixes with foreign species will only be used during reclamation where required to avoid erosion problems.

☒ toxin / heavy accumulation

☒ other: Flaring and venting emissions

Additional research required to determine potential impacts due to flaring and venting operations.

☒ N/A

2. Wildlife & Fish

☒ effects on rare, threatened or endangered species

☒ fish population changes

☒ waterfowl population changes

☒ breeding disturbance

☒ population reduction

Potential impacts identified.

☒ species diversity change

☒ health changes (Identify)

☒ behavioural changes (Identify)

Possible displacement from habitat.

☒ habitat changes / effects

Possible habitat reduction for some species.

☒ game species effects

Potential impacts identified.

☒ toxins / heavy metals

☒ forestry changes

☒ agricultural changes

X other: Flaring and venting emissions.

Additional research required to determine potential impacts due to flaring and venting operations.

☒ N/A

INTERACTING ENVIRONMENT

1. Habitat and Communities

X predator-prey

Possible increased predation on new access corridors and clearings.

☒ wildlife habitat / ecosystem composition changes

☒ reduction / removal of keystone or endangered species

☒ removal of wildlife corridor or buffer zone

☒ other: _____

☒ N/A

2. Social and Economic

☒ planning / zoning changes or conflicts

☒ increase in urban facilities or services use

☒ rental house

☒ human health hazard

☒ impair the recreational use of water or aesthetic quality

☒ affect water use for other purposes

☒ affect other land use operations

X quality of life changes

Short term increase in employment in the local communities.

☒ public concern

☒ other: _____

☒ N/A

3. Cultural and Heritage

☒ affects to historic property

☒ increased economic pressure

on historic properties

☒ change to or loss of historic resources

☒ change to or loss of archaeological resources

☒ increased pressure on archaeological sites

☒ change to or loss of aesthetically important site

☒ affects to aboriginal lifestyle

Possible short term impacts on traditional land use.

☒ other: _____

☒ N/A

Review Board staff reviewed the following documentation to prepare this checklist.

- The Water License and Land Use permit applications, including the accompanying environmental screening report, *Environmental Screening Report for the Cameron Hills Drilling Project*, submitted by the developer;
- The comments received from the developer, government and First Nations organizations during the application review period; and
- The MVLWB preliminary screening report and the reasons for the EA referral.
- Two 1999 CEAA screening forms for work (Land Use Permits N1998A0942 and N1998A0943) by the same developer in the Cameron Hills along with other documentation related to these screenings;
- A December 18, 1998 report by ARC Inc. prepared for the developer in support of their 1999 work and titled *Environmental Assessment Cameron Hills Wells I-74 and C-75*; and
- An October 1991 report by Hardy BBT Limited prepared for the developer and titled *Cameron Hills Oil Development Plan Environmental Components*.