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Subject: Paramount CEA Discussion paper

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The Cumulative Effects Assessment Approach Discussion Paper for the Paramount Cameron Hills Project is attached for your review in preparation for our August 13 meeting in Yellowknife. Look forward to seeing you then

Cumulative Effects Assessment Approach Discussion Paper for the Paramount Cameron Hills Project

Introduction

The purpose of this paper is to provide a background for discussions regarding a proposed approach to cumulative effects assessment for the Paramount Cameron Hills Development Project. This approach builds on the MVEIRB Terms of Reference issued August 8, 2003 specific to this project.

History

In April 2003, Paramount applied to the Mackenzie Valley Land and Water Board (MVLWB) for an amendment to an existing Land Use Permit. The amendment proposed 5 wells and 22 km of pipeline in addition to the existing and permitted development. The proposed development was referred to an Environmental Assessment ("EA") on May 28, 2003. The concern is over possible cumulative impacts of the proposed development in combination with existing developments. The scope of this Environmental Assessment includes all future, non-permitted activities and their **direct, indirect** and cumulative impacts, within the Cameron Hills Significant Discovery Licenses (SDLA) and all Production Licenses held by Paramount Resources, or one of its partners.

Cumulative Environmental Effects Assessment

Cumulative effects are changes in the landscape composition and processes as a result of past, present and future developments. Cumulative effects assessment can differ from a project-specific environmental assessment by considering larger study areas, longer time frames and the effects of other developments, currently operating or that will be operating in the foreseeable future, within that study area. There is no standard accepted method for conducting a cumulative effects assessment given the complexity of this task. Thus, methods and approaches must reflect the objectives and the issues of the project(s) development. The main limitations of cumulative effects assessment are:

- A lack of specific spatial information;
- Difficulty in quantifying environmental change;
- Difficulty in predicting synergistic effects;
- Availability of realistic site specific information on present and future developments; and
- Difficulty in defining resource use and ecological thresholds.

All of these considerations must be evaluated when developing an approach for a cumulative effects assessment. When assessing cumulative effects, one must consider the differences between project specific assessments and regional planning initiatives. Regional planning initiatives are generally conducted by governmental or multi-agency resource planners to consider the effects of all past, present and reasonably foreseeable future disturbances over a large geographic area and long time frames. The studies are used to develop management objectives, policies, criteria, and with the help of inclusive models can help to understand ecological thresholds and develop best management practices. A Landscape Cumulative Effects Simulator (ALCES) (Stelfox et al. 2002) is one such model that is used for regional planning purposes. This model tracks natural processes in conjunction with several land use practices on a

Rationale and Scope

The Cameron Hills Project has already undergone two approved Environmental Assessments: the first for drilling and testing of 9 wells and the second examined a gathering system to 21 wells including wellsite facilities, a central battery, and approximately 75 km of pipeline. Both of these projects were approved, therefore, the board has already established that the individual components of the development under assessment generally are not likely to have a significant adverse effect.

This assessment will focus on the cumulative effects of drilling, evaluation and tie-in of up to 50 wells over a period of 10 years, field production of oil and gas over 15 to 20 years and abandonment and reclamation of the entire development (i.e. these 50 wells).

Spatial and Temporal Boundaries

Spatial boundaries will vary for terrestrial resources, air and water. A cumulative effects study area (CESA) will be determined for each of the terrestrial, aquatic and socio-economic components based on the potential impacts of the project. The spatial boundaries and rationale for those boundaries will be clearly defined in the assessment report.

The temporal boundaries for the environmental effects in the baseline case, the application case and the planned development case will vary depending on the receptor. The proposed temporal boundaries for each of the cases are as follows:

1. environmental setting – defined as the land base prior to development; this is assumed to be 1960, in the case of direct effects, the development footprints will be "lifted off" the current environment;
2. baseline case – includes existing and approved developments at June of 2003; sets the baseline against which incremental effects of proposed and future activities will be assessed;
3. application case – proposed Paramount developments for 2003/2004; i.e. the subject of this application;
4. planned development case – maximum extent of Paramount's operations at 2013 including production up to 2023; presents a forecast of the potential level of development over the next 10 years.

The temporal effects of these development cases will be evaluated to a point at which equivalent capability/condition is achieved for each VEC or receptor. There may be project related effects that are not reversible. This approach to spatial and temporal scope addresses the approach outlined in the final ToR, which states that the spatial and temporal component should be set according to the potential impacts rather than the duration of the development.

Impact Criteria

Environmental and socio-economic impacts will be evaluated in terms of quantitative impact criteria. These criteria are based on attributes such as direction, magnitude, geographic extent, duration, frequency, reversibility and probability. The outcome of this assessment is a rating system of the Environmental Consequences of the project on a specific environmental or socio-economic receptor. This Environmental Consequence can be used by the Review Board in their determination of impact significance.

Terrestrial

The terrestrial section will include terrain (G-2), soil (G-3), wildlife (G-5), and vegetation (G-6). These disciplines will use the same spatial and temporal boundaries; will assess baseline conditions based on existing information and review of previous Environmental Assessments. This section will discuss potential impacts to terrestrial resources in the Terrestrial CESA and may include discussion of special areas outside the potential area of impact, or CESA, where a more regional discussion is warranted.

Aquatics

The aquatics section will include surface and groundwater (G-4) and fish (G-5). These disciplines will use the same spatial and temporal boundaries, and will assess baseline conditions based on existing information and review of previous Environmental Assessments.

Socio-Economic

The socio-economic section will include cultural and heritage resources (G-7), traditional harvesting (G-8), health and other social indicators (G-9) and economic factors (G-10). The cultural/heritage resources and traditional harvesting components will use the same spatial boundaries, i.e. CESA. The health, social and economic sections will focus on specific communities rather than an area of impact. Temporal boundaries may differ for each of these components depending on specific potential project impacts. All components will assess baseline conditions based on existing information and review of previous Environmental Assessments.

G-1 Air

A comprehensive air quality assessment of the Paramount operations at Cameron Hills will be completed. The assessment will address issues detailed in the ToR (including any changes in the operations that have occurred since the last EA, e.g. the use of sour gas as fuel gas for compressors) and prior Paramount applications at Cameron Hills. As such, the assessment will evaluate the cumulative air quality effects of the Cameron Hills Development.

The key compounds that will be assessed are SO_2 and NO_2. In addition, ground level concentrations of incomplete combustion products associated with flaring operations will be determined. The assessment will also quantify greenhouse gas emissions from the fully developed Cameron Hills project.

Ground-level concentrations of the key compounds, SO_2 and NO_2, will be determined using the ISCST3 dispersion model. For consistency with earlier modeling work for the gathering system, we are planning to use Fort Smith meteorological data.

Emissions from the Cameron Hills development will be assessed, including:

- SO_2 and NO_2 from the fully developed Cameron Hills Project, including all of the proposed wells and the fully developed facility; and
- SO_2 from well test flaring.

G-4 Water - Surface and Groundwater

Surface Water Balance

VECs

The Surface Water VECs for this project will be water bodies in the Aquatic CESA and the Cameron River.

Baseline Tasks

- **Estimate water usage**

The major consumptive uses of water by Paramount are expected to be for drilling and, winter road construction, Water used for the operation of the camp(s) are not considered in this assessment as it will be hauled-in from a source outside the project area. A time series of expected annual water use will be developed. The projected annual activity determining kilometers of winter road to be constructed and number of wells drilled will be utilized.

- **Assess Lake Volumes from Bathymetry**

Bathymetry has been conducted on four lakes in the Cameron Hills project area. The storage capacity of these lakes will be assessed to estimate the cumulative effects of water withdrawal on surface water in the Aquatic CESA. Alternative water sources will be addressed as appropriate.

CEA Approach

- **Evaluate Lake Water Balance**

The primary objective of the lake water balance is to determine if withdrawals from the lakes would be replenished annually, or if a progressive reduction in lake water levels would occur.

This task involves evaluation of the annual water balance for water bodies identified as Lakes 1 and 4. The water balance will incorporate the following hydrologic components:

- lake inflows from contributing watersheds;
- direct precipitation;
- evaporation; and
- withdrawals by Paramount.

Lake inflows will be estimated from annual yield data from nearby gauged watersheds, and from an evaluation of the precipitation and evaporation data.

- **Effect of Withdrawals on the Cameron River**

Withdrawals by Paramount will occur during late winter, when outflows from the lakes to the Cameron River are expected to be negligible. A screening-level assessment of the potential effect of the withdrawals on the Cameron River will be conducted by comparing annual withdrawals by Paramount to mean annual flows in the Cameron River at its exit point from the Paramount lease area. Cameron River flows will be estimated using flow data from regional gauged watersheds.

Baseline Tasks

- summarize existing information from previous EAs and any existing monitoring programs; and
- model habitat under baseline conditions and estimate available habitat (ha), habitat effectiveness and fragmentation parameters.

CEA Approach

Golder will conduct the CEA using an integrated approach between traditional habitat suitability index (HSI) approaches and ALCES (if appropriate). Results can be compared and advantages and limitations of each approach will be discussed with the intent of complementing each other.

Traditional Approach

- use HSI-type models with spatial components (i.e., buffering) for VEC species and run for each project case as described above to determine changes in habitat availability and quality;
- use GIS methods to determine changes in fragmentation levels for VECs through each case; and
- compare all results generated with baseline values.

ALCES Approach

- align built-in ALCES habitat models with spatial HSI models for VECs;
- ensure Oil and Gas land use variables are as accurate as possible through Paramount's information; and
- determine approach to run ALCES dependent on time snapshot for end assessment and rates of development from baseline to complete development.

G-6 Fish

VECs

Fish habitat and fish abundance for indicator species will be the VECs for the fish section.

Baseline Tasks

- evaluate existing fisheries resources based on past E A work and other l iterature and government sources; and
- summarize predicted effects of stream crossings and spills from past EAs.

CEA Approach

The approach to the CEA will be to assess effects of stream crossings and other related direct and indirect effects from the Cameron Hills program at peak production in combination with other potential developments or activities in the Aquatics CESA. Information from the surface water and water quality sections will be integrated into this section to predict potential impacts. Effects to potential fish habitat in the Cameron River and other surface water bodies will be the focus of this assessment. Other potential fish bearing water bodies and watercourses will also be identified and discussed.

will be based on the known and predicted regional distribution of historical resources. Sensitive terrain features will also be identified in the study area.

G-9 Traditional Harvesting

VECs

The VECs for this section will be the number of moose and caribou traditionally harvested on landscape.

General Approach

Potential effects to traditional harvesting will be assessed by establishing a baseline level of traditional harvesting and predicting the potential effects of the project in combination with other activities. The baseline levels of hunting, fishing and trapping will established by obtaining a quantitative assessment of traditional and other harvesting activities in the project area from RWED, if available. Harvesting records from two trappers in the area will also be obtained if possible. If applicable, the ALCES model will be used to track harvest rates including sport, aboriginal, and poaching based on the initial assumption of rates. Information from the wildlife assessment (VECs include moose, caribou and furbearers) will be used to supplement this section

G-10 Other Health, Social and Economic Factors

VECs

The variables included in this assessment will include use of social services, alcohol and drug use and teen pregnancy, NWT economy and community economy. VECs will be determined based on the potential for the project to impact these variables.

CEA Approach

To address the requirements of the ToR and complete the socio-economic component of the cumulative environmental assessment, the following tasks will be completed:

- Review Paramount's earlier EAs in the area, as well as any other company documentation (for example, records of consultation) available on interaction between the existing projects and affected communities.
- Undertake any additional literature review required to identify ongoing social and economic trends of affected communities and in the GNWT generally, in relation specifically to experiences with the oil and gas sector and with the transition to a mixed economy.
- Update the data on affected communities, from the results of the newest census and from other sources as available.
- Scope the CEA issues, including their temporal and spatial boundaries, based on the information collected as per the above.

The information collected above will be analyzed, qualitatively and where possible quantitatively to identify the potential cumulative impacts to local communities. Mitigative measures and monitoring proposed to date will be summarized and additional mitigation requirements will be identified. The residual cumulative effects will then be assessed.