

13. CUMULATIVE EFFECTS

Introduction

The findings of the environmental impact assessment for cumulative effects of the Mackenzie Gas Project (see EIS Volume 5, Section 12) were based on the following components (see Section 1, Introduction, of this document):

- anchor fields
- gathering pipelines and associated facilities
- NGL and gas pipeline corridor
- gas pipeline corridor
- infrastructure
- NGTL NWML Dickins Lake Section

The two NGTL pipeline sections, Dickins Lake Section and Vardie River Section, are located in northwestern Alberta. No cumulative effects assessment (CEA) was done for northwestern Alberta because of the lack of data. This supplemental information includes:

- new information for the Vardie River Section
- a cumulative effects assessment (CEA) for northwestern Alberta based on the new information
- a combined project effects assessment that includes the Mackenzie Gas Project and NGTL's Dickins Lake and Vardie River sections

For a summary of the EIS findings for cumulative effects, see under EIS Summary.

EIS Summary

In its assessment of cumulative effects, the EIS (see Volume 5, Section 12) concluded that:

- the Mackenzie Gas Project does not contribute significant cumulative effects
- there are no significant overall cumulative effects
- the Mackenzie Gas Project contributes to one potential cumulative effect of management concern – direct grizzly bear mortality, which could be addressed with diligent monitoring and management by responsible parties. This potential effect will not be a concern in northwestern Alberta because of the low population of grizzly bears in the area.

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These results indicate that, despite the size and duration of operations, the contribution to cumulative effects by the Mackenzie Gas Project is not expected to be significant. The results also mean, based on available information and assessment methods, no issues of management concern associated with cumulative effects on a valued component are likely in the future. These conclusions are based on the assumption that NGTL will develop and implement appropriate management and monitoring programs, as approved by the applicable regulatory authority.

Study Areas

The study area for the biophysical cumulative effects assessment for the Dickins Lake and Vardie River sections (including their potential contribution to cumulative effects and overall cumulative effects), considered:

- air – assessment of potential effects on air quality
- noise – assessment of potential effects on noise
- aquatic disciplines – assessment of potential effects on groundwater, hydrology, water quality, and fish and fish habitat
- terrestrial disciplines – assessment of potential effects on soils, landforms and permafrost, vegetation and wildlife

The air RSA was based on one large airshed, and its shape and size were derived from air quality modelling requirements.

The noise RSA was based on a fixed distance from the noise-generating components at the NGTL Thunder Creek compressor station.

The aquatic RSA was based on site-specific drainage areas associated with the potential contribution to effects of the Dickins Lake and Vardie River sections.

The terrestrial RSA was based on wildlife distribution and occurrence, and was the region in which other land uses that could interact with the project were mapped and identified.

Baseline

Baseline conditions, study areas and valued components for this CEA for the Dickins Lake and Vardie River sections are the same as those identified in EIS Volume 5, Sections 2 to 10.

Existing land uses in the region include:

- timber harvesting
- oil and gas exploration and production
- trapping
- hunting
- fishing

Observable disturbances include:

- seismic lines
- pipeline rights-of-way
- wells
- trails
- resource access roads

The rate of renewable resource harvesting is unknown. However, it is likely low given the limited access in the region.

Reasonably foreseeable land uses include future oil and gas activities and timber harvesting. Although it is a reasonable assumption that oil and gas activity will continue in the region, specific information describing such activities is not available. The timber harvesting is by Tolko Industries, the only Forest Management Area (FMA) operator in the region. Tolko has proposed constructing an access road, during the winter of 2004–2005, in its FMA south of NGTL's Thunder Creek compressor station. Locations of Tolko's other future operations in the region are unknown.

There are no known hypothetical projects.

Analysis and Significance

The potential for the Dickins Lake and Vardie River sections to contribute to cumulative effects is limited, because the pipeline is remote from other land uses and motorized vehicle access is limited. A high-level overview of the cumulative effects on most biophysical resources indicated that little or no overlap exists between the effects of the Dickins Lake and Vardie River sections, and other reasonably foreseeable projects. Air quality was considered at higher risk for significant cumulative effects than other resources. Therefore, a quantitative analysis of cumulative effects was completed only for air quality.

Effects on Air Quality

Cumulative effects of the proposed heater at the existing NGTL Thunder Creek compressor station, combined with other sources in the region, are discussed following. Based on a review of source information, the following existing, approved or reasonably foreseeable projects were included:

- NGTL Thunder Creek compressor station
- Apache Corporation Zama A gas conditioning facility
- NGTL interconnect facility

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For a summary of SO₂ and NO_x emissions for these facilities, see Section 2, Air Quality. The Building Profile and Input Program (BPIP) was used to incorporate the potential effects of building downwash on compressor emissions because of the:

- proximity of the existing NGTL Thunder Creek compressor station to the proposed additional heater at the compressor station
- potential for building wake influences on the dispersion of emissions from the compressor station

Sulphur Dioxide

For a summary of predicted ground-level SO₂ concentrations near the NGTL Thunder Creek compressor station from other existing, approved or disclosed sources combined with NGTL Thunder Creek compressor station emissions, see Table 13-1. All predicted 1-hour, 24-hour and annual SO₂ concentrations are below Alberta ambient air quality objectives.

Table 13-1: Cumulative Sulphur Dioxide Predictions at the NGTL Thunder Creek Compressor Station

Area	Parameter	Averaging Period Predictions ^a		
		1-hour	24-hour	Annual
NGTL Thunder Creek compressor station local study area	Maximum sulphur dioxide (SO ₂) concentration (µg/m ³)	3.6	2.0	1.2
	Distance to maximum ¹ (km)	<0.1	0.1	<0.1
	Direction to maximum ¹	S	N	S
	Expected occurrences exceeding standard ²	0	0	0
	Area exceeding standard ³ (ha)	0	0	0
SO ₂ standards ⁴ (µg/m ³)		450	150	30
NOTES: S = south N = north a The predictions in the table include the effects of combined emissions from project sources in the airshed, plus other major sources in the region, and a background concentration of 1.2 µg/m ³ . 1 Distance and direction are relative to the NGTL Thunder Creek compressor station 2 The <i>expected occurrences exceeding standard</i> is the number of hours, days or years with predicted concentrations exceeding applicable standards. It is the average of five years of modelling data, so it might not be a whole number. 3 The <i>area exceeding standard</i> is the total area over which the predicted 1-hour, 24-hour or annual concentrations exceeded applicable standards 4 Alberta ambient air quality objectives (AENV 2004)				

Nitrogen Dioxide

For a summary of maximum NO_x and NO₂ predictions near the NGTL Thunder Creek compressor station from other existing, approved or disclosed sources combined with NGTL Thunder Creek compressor station emissions, see Table 13-2. All predictions are below federal objectives.

Table 13-2: Cumulative Nitrogen Dioxide and Oxides of Nitrogen Predictions at the NGTL Thunder Creek Compressor Station

Area	Parameter	Averaging Period Predictions ^a		
		1-hour	24-hour	Annual
NGTL Thunder Creek compressor station local study area	Maximum oxides of nitrogen (NO _x) concentration (µg/m ³)	67.9	25.5	3.3
	Maximum nitrogen dioxide (NO ₂) concentration (µg/m ³)	31.6	15.3	4.3
	Distance to maximum ¹ (km)	9.4	0.1	<0.1
	Direction to maximum ¹	NNE	W	S
	Expected occurrences exceeding objective ²	0	0	0
	Area exceeding objective ³ (ha)	0	0	0
NO ₂ objectives ⁴ (µg/m ³)		400	200	60
<p>NOTES:</p> <p>NNE = north-northeast S = south W = west</p> <p>a Predictions in the table include the effects of combined emissions from project sources in the airshed plus other major sources in the region, and a background concentration of 2.8 µg/m³</p> <p>1 Distance and direction are relative to the NGTL Thunder Creek compressor station</p> <p>2 The <i>expected occurrences exceeding objective</i> is the number of hours, days or years with predicted concentrations exceeding applicable objectives. It is the average of five years of modelling data, so it might not be a whole number.</p> <p>3 The <i>area exceeding objective</i> is the total area over which the predicted 1-hour, 24-hour or annual concentrations exceeded applicable objectives</p> <p>4 Alberta ambient air quality objectives (AENV 2004)</p>				

Potential Acid Input

For a summary of PAI predictions near the NGTL Thunder Creek compressor station resulting from other existing, approved or disclosed sources combined with NGTL Thunder Creek compressor station emissions, see Table 13-3. The PAI levels integrated over the LSA are conservative estimates of gridded PAI levels because the LSA is only 40,000 ha. This is much smaller than 1° by 1° grid cells that are at least 500,000 ha in size at these latitudes (see Section 2, Air Quality). The area PAI prediction is well below the Clean Air Strategic Alliance (CASA) monitoring load for the most sensitive ecosystems.

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Table 13-3: Cumulative Potential Acid Input Predictions at the NGTL Thunder Creek Compressor Station

Area	Parameter	Results ^a
NGTL Thunder Creek compressor station local study area	Maximum potential acid input (PAI) (keq/ha/a)	0.07
	Area PAI (keq/ha/a) ¹	0.05
	Maximum sulphate deposition (kg/ha/a)	3.17
	Maximum nitrate deposition (kg/ha/a)	3.06
	Area with PAI >0.17 keq/ha/a ^b (ha)	0
	Area with PAI >0.25 keq/ha/a ^c (ha)	0

NOTES:

- a Predictions in the table include the effects of combined emissions from project sources in the airshed plus other major sources in the region, and a background deposition rate of 0.05 keq/ha/a
- b 0.17 keq/ha/a represents the monitoring load value for sensitive ecosystems
- c 0.25 keq/ha/a represents the critical load value for sensitive ecosystems
- 1 Area PAI represents integrated PAI levels over the entire 40,000 ha LSA, which is considerably smaller than 1° by 1° grid cells that are more than 500,000 ha in size at this latitude

Effects on Noise

Project sound levels will not interact cumulatively as there are no receptors to project noise.

Effects on Aquatic Resources

The limited spatial extent of transport of waterborne constituents, such as sediment, will likely limit interaction of the effects of the Dickins Lake and Vardie River sections with other land uses.

Effects from the Dickins Lake and Vardie River sections on groundwater, hydrology, water quality, fish and fish habitat, will be through waterborne pathways. These effects will be low magnitude and local. Therefore, the contribution to cumulative effects will be nonexistent or low magnitude.

Effects on Terrestrial Resources

The Dickins Lake Section involves clearing a new pipeline right-of-way, whereas the Vardie River Section requires widening an existing NGTL right-of-way and, potentially expanding a camp. No new access roads are required for these facilities. The clearing that does occur will be about 290 ha, representing a negligible incremental amount within northwestern Alberta.

For about 15 km in the Dickins Lake Section, the pipeline crosses the Bistcho Lake peat plateau bog, which is listed as a provincial environmentally significant area (ESA). The area is described as one of the most diverse and extensive subarctic wetlands in Alberta. However, the vegetation assessment (see Section 9) indicates that the effects of the Dickins Lake and Vardie River sections on vegetation communities of concern are not significant.

There are no other known activities that might affect the Bistcho Lake peat plateau bog. Therefore, the contribution to cumulative effects will be nonexistent or low magnitude.

The pipeline also crosses a caribou management zone and must be in compliance with the Red Earth Caribou Protection Plan. In Alberta, delineation of these zones is based on identification of suitable habitat and available information on caribou distribution. Resource extraction companies are asked to follow specific land-use guidelines for operations within caribou management zones. The wildlife assessment (see Section 10) concluded that the effects of the Dickins Lake and Vardie River sections on woodland caribou would not be significant because only about 1 ha of effective woodland caribou winter foraging habitat would be removed during construction. Effects-management measures, including a caribou protection plan to be developed by NGTL, will address the potential of the Dickins Lake and Vardie River sections to contribute to cumulative effects.

Effects of the Dickins Lake and Vardie River sections on soils, landforms and permafrost, vegetation and wildlife, will be low magnitude and local in geographic extent. Therefore, the contribution to cumulative effects will be nonexistent or low magnitude.

Combined Project Effects

In all cases, overall cumulative effects are negligible. Except for woodland caribou, no known land and resource management concerns exist. Contributions to cumulative effects are not significant.

The EIS concluded that the Mackenzie Gas Project would produce no significant cumulative effects.

This assessment for northwestern Alberta concludes that the Mackenzie Gas Project combined with NGTL's Dickins Lake and Vardie River sections will also produce no significant cumulative effects.

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