

Dominion Diamond Corporation

Developer's Assessment
Report – Technical
Sessions, April 2015

Air Quality



Overview and Introduction

General overview of presentation

- Introduction
 - A summary of updated data available
- A review of DAR assessment approach and conclusions
- Common topics from Information Requests:
 - Dust deposition
 - Greenhouse Gases
 - Waste Incinerator: Dioxin and Furan Emissions
 - Air Emission Mitigation
 - Air Quality Management and Monitoring Plan (AQMMP)

Introduction

Locations of air quality assessment results:

Original Assessment

- Section 7 of the DAR

Updated Data

- 2015 Jay Project Air Quality Assessment Update Technical Memorandum
 - Refinements were made to provide more accurate emission assumptions for PM_{2.5}, TSP, VOCs, PAHs, metals, dioxins, and furans
 - Updated model predictions showed similar conclusions as those in the DAR
- TSP deposition results (same as those predicted in the DAR) are shown graphically in the response to DAR-LKDFN-IR-10
 - TSP deposition rates were compared against the most stringent dustfall objective from BC and Alberta (not applicable in NWT) for perspective

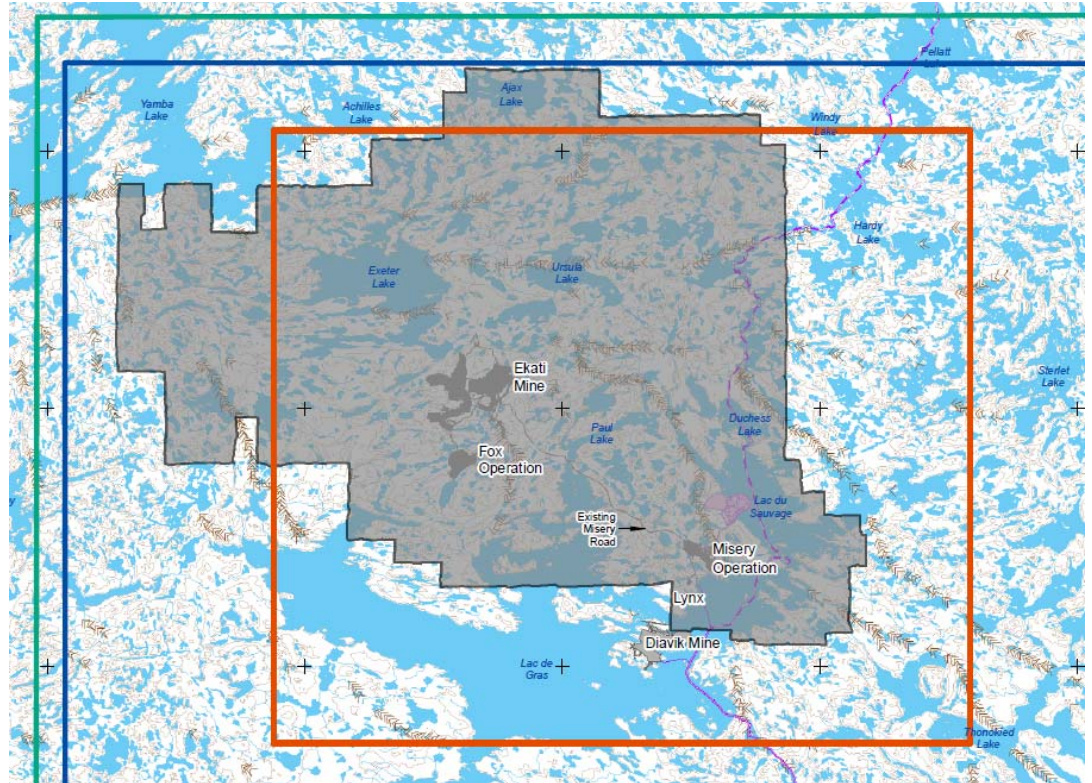
Assessment Approach – Assessment Endpoints, Measurement Indicators and Assessment Cases

Valued Component	Assessment Endpoint	Measurement Indicator
Air Quality	Compliance with applicable regulatory ambient air quality standards and objectives.	Predicted maximum concentrations of: <ul style="list-style-type: none">• SO₂;• NO₂;• CO; and,• TSP and PM_{2.5}

- Base Case: Year 2015 before the start of the Project and includes existing developments as well as planned developments that are also approved.
- Application Case: Base Case + Project with Base Case Ekati mining activities replaced by Project mining activities
- Reasonable Foreseeable Development Case: Application Case + Foreseeable Developments

Assessment Approach - Air Quality Study Areas

- Air Quality Regional Study Area is 107 km by 111 km and encompasses sensitive receptors in the region
- Air Quality Local Study Area is 68 km by 60 km and encompasses both Ekati Mine and Diavik Mine
- A conservative approach of assuming that compliance with NWT air quality standards is required at the disturbance footprint boundary rather than at the claim block boundary



Assessment Approach – Emissions and Dispersion Modelling

- Air Emission Estimation Approach
 - Two primary pathways identified: emissions from combustion sources ,and fugitive dust emissions from mining activities
 - Took a generally conservative approach where possible in emission estimation
 - Assessed compounds: SO₂, NO₂, CO, PM_{2.5}, TSP, VOCs, PAHs, metals, dioxins, and furans (some compounds do not have applicable regulatory air quality criteria)
- Dispersion Modelling
 - Simulated emissions in a dispersion model using one-year of meteorological data
 - Dispersion model was used to provide predicted air concentrations at ground-level and annual deposition rates
 - Predictions were used in assessment for other disciplines (e.g., human health, water quality, vegetation, and wildlife)

Subject of Note: Air Quality - Assessment Results

- Model predictions outside of the Project disturbance footprint rather than claim block were compared against applicable regulatory criteria
- Predicted SO₂ and CO concentrations: in compliance with GNWT criteria and well under the criteria
- Predicted NO₂ concentrations
 - High concentrations were predicted near edge of the Jay Pit and haul roads due to mine fleet exhaust
 - Predictions exceeded the GNWT standards at few locations at the edge of the Jay Pits and haul roads
 - Exceedances are confined to areas (0.5 to 29 hectare in total) within a few hundred metres from the edge of the disturbance footprint
 - Predicted frequencies of 1-hour and 24-hour exceedances are limited to 5 hour and 2 days per year, respectively

Subject of Note: Air Quality - Summary

- Project emissions were determined to not have significant adverse effects to air quality, although there will be temporary changes to air quality
 - SO₂ and CO concentrations meet the NWT AAQS
 - NO₂ concentrations are near guideline levels immediately outside the Project development area, although a few exceedances are predicted occur
 - Exceedances of PM_{2.5} and TSP above NWT AAQS are predicted within 5 km the Project location
- While some exceedances of air quality criteria (the endpoint) do occur, effects are:
 - Local and reversible in the short or medium term
- The effects of air emissions were also considered in other discipline assessments
- Conservative emission scenarios were assessed
- Air Quality Monitoring programs ongoing at Ekati demonstrate that measurements near to the mine are lower than guideline values
- Incremental and cumulative effects from the Project and other developments are not significant

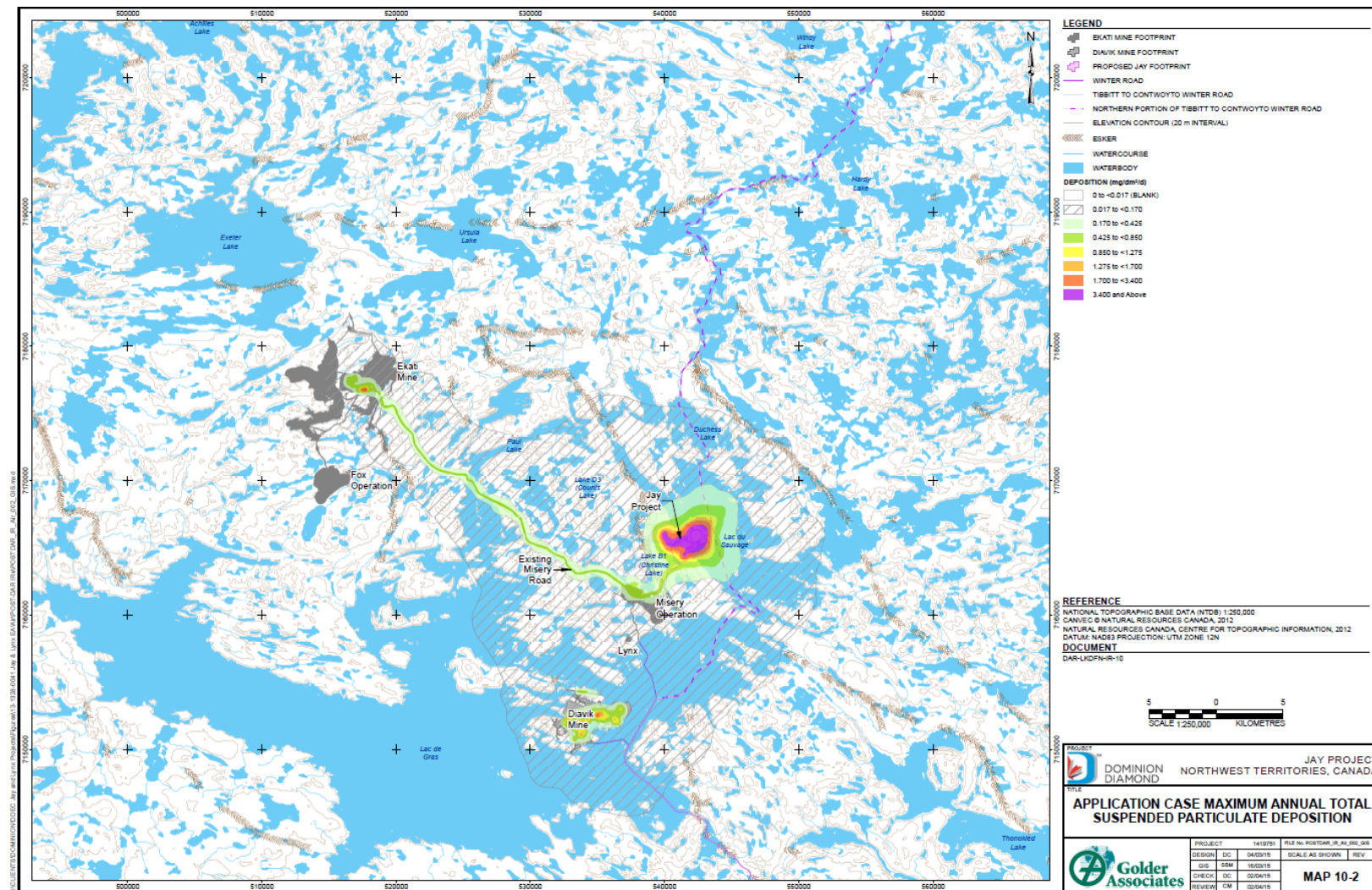
Air Quality - Assessment Results (Continued)

- Predicted PM_{2.5} concentrations
 - Higher concentrations were predicted around open pits at the Project and nearby mines due to road dust emissions
 - Area of exceedance over GNWT standards may extend as far as 6 km from the edge of the disturbance footprint
- Predicted TSP concentrations
 - Higher concentrations were predicted around open pits and near the haul roads at the Project and nearby mines due to road dust emissions
 - Area of exceedance over GNWT standards may extend as far as 4 km from the edge of the disturbance footprint
- Predicted TSP deposition (DAR-LKDFN-IR-10 response)
 - Predicted TSP deposition rates exceeded dustfall benchmarks (other jurisdictions (not applicable) from at areas within 500 m from the disturbance footprint

IR Topic: Dust Deposition

- Predicted TSP deposition rates were shown graphically in the response for DAR-LKDFN-IR-10
 - TSP is not “dust”; it only represents a portion of “dust” (airborne particles that are less than 100 microns in aerodynamic diameter).
 - Compared to dust, it represents largest range of particles that is more likely to be suspended in the air and be transported over greater distances.
 - Predicted TSP deposition rates were compared to a benchmark (the most stringent dust fall objective, 1.7 mg/dm²/d). This objective is not applicable in NWT but is compared against the predictions for perspective.
 - Predicted TSP deposition rates exceeding the benchmark are confined to an area within 500 m from the disturbance boundary.
 - Predictions fall below 10% of the benchmark within 3 km from the boundary.
 - Predictions fall below 1% of the benchmark within 10 km from the boundary.

IR Topic: Dust Deposition (Continued)



IR Topic: Greenhouse Gases

- Project GHG emissions were updated to include GHG emissions from all aircraft and ice road traffic associated with the Project (DAR-MVEIRB-IR-73 and DAR-NSMA-IR-06).
- Annual Project GHG emissions throughout the life of the Project were presented in the response to DAR-MVEIRB-IR-73.
- The existing Ekati Mine's GHG contributes 12% of the 2015 NWT annual GHG emissions. The Project is expected to contribute approximately 13% of the 2020 NWT annual GHG emissions.

	Base Case (2015)	Application Case (2022)	Change in percentage
Maximum Project Annual GHG Emissions (kt CO2E/yr)	271	403	—
Northwest Territories Annual GHG emissions (kt CO2E/yr)	2,292	3,089	—
% of total NWT GHG emissions	12%	13%	1%

IR Topic: Waste Incineration: Dioxin & Furan Emissions

- Project is not expected to increase the waste incineration capacity from that of the existing Ekati Mine.
- Two new incinerators capable of meeting the Canada Wide Standards (CWS) for Dioxin and Furans were installed at the Ekati Mine in 2012 to replace older waste incinerators. These new waste incinerators will be used through the life of the Project.
- Stack tests were conducted on the new incinerators in 2013 and passed the CWS for dioxins, furans and mercury.
- An Incinerator Management Plan (a part of Waste Management Plane) has been created for Ekati Mine to ensure the safe and efficient operation of the incinerators.
- Management plans are reviewed periodically and updated as required to mitigate impacts to the environment.

IR Topic: Mitigation and Monitoring

Key mitigation proposed at the Project:

- Compliance with regulatory emission requirements
- Implementation of good design and operational practices to mitigate and reduce emissions and to improve energy efficiencies

Current AQMMP (2009) for Ekati Mine includes air emission mitigation measures such as:

- use of low sulphur diesel fuel
- preventative maintenance programs on machinery to ensure optimum operation of all combustion and fugitive emission sources
- control of fugitive dust emissions through road watering, use of granite waste rock as construction materials and vehicle speed regulation
- application of dust suppressant (DL-10) to areas supporting heavy traffic volume in compliance with the GNWT Environmental Guideline for Dust Suppression
- application of Boeing approved EK-35 dust suppressant on the Ekati airstrip
- the installation of high efficiency incinerators
- inclusion of a “No Idle” campaign
- an on-site shuttle service

IR Topic: Mitigation and Monitoring (Continued)

Existing Air Quality monitoring at Ekati Mine

- Continuous air quality monitoring of NO_x , NO_2 , $\text{PM}_{2.5}$, and TSP at Polar Explosives station
- Intermittent TSP sampling at Grizzly Lake and Long Lake Containment Facility
- Monthly dustfall sampling mostly co-located with lichen and snow sampling stations

Follow-up:

- The mitigation for existing Ekati Mine will be incorporated into the updated AQMMP for the Project
- It is Dominion Diamond's intention to amend the AQMMP to address monitoring and mitigation of air quality for the Jay Project
- Detailed changes to the AQMMP will be developed as part of the regulatory permitting based on the outcome of the Environmental Assessment; the Government of the Northwest Territories, Environment Canada, aboriginal communities, and other organizations will be engaged during the amendment of the AQMMP

Questions?

