



**Independent Environmental
Monitoring Agency**



Air Quality Monitoring Program

**Review of Ekati's 2005 Air Quality Monitoring Program
and Progress to Date**

3 December 2008



Presentation Outline

- Air Quality Monitoring at Ekati
- Air Quality Management at Ekati
- 2005 Air Quality Monitoring Program
- Review of the 2005 Results
- BHPB Response to Date
- Agency Assessment



Air Quality Monitoring at Ekati

- Air quality was a concern during the review of the mine, largely related to dust
- Air quality monitoring is required under the Environmental Agreement (Article VII)
- Air quality monitoring began in 1998, and is reported every three years
 - reports submitted in 2002 and 2005



Air Quality Management at Ekati

- Air quality is a valued ecosystem component by BHPB
- BHPB is concerned with visibility, worker health and safety, effects on wildlife, vegetation and water quality
- *The Agency's main concern is with dust and possible effects on vegetation and wildlife, particularly caribou*
- BHPB's objective is of "preservation of the existing ambient air quality throughout the life of the mine"
- Latest version of the Air Quality Management and Monitoring Plan is from 2003



Air Quality Management at Ekati

- low sulphur diesel fuel
- filters to capture dust from ore processing
- preventive maintenance on machinery to ensure lower emissions
- road watering and vehicle speed limits
- dust suppressant on roads and airstrip
- construction of a better incinerator



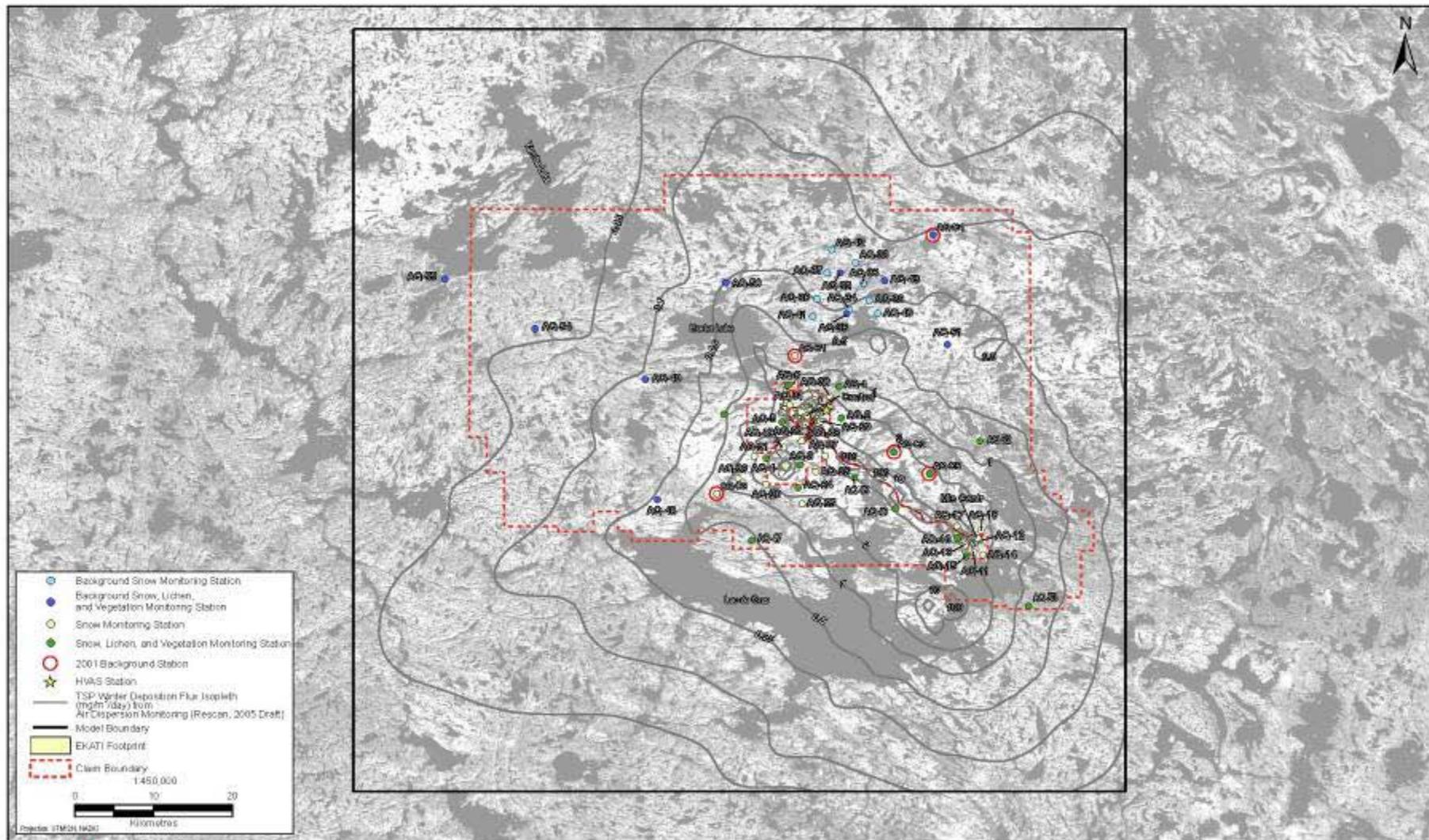
Air Quality Monitoring at Ekati

- air emissions and Greenhouse gases are calculated each year
- high volume air sampling carried out each year
- snow and lichen sampling (done every 3 years)
- vegetation surveys done every 3 years



Highlights from 2005 Monitoring

- NO_x, SO_x and Greenhouse gas emissions increased from 2002 to 2005 (due to increased activity at mine)
- particulate matter emissions (dust) decreased from 2002 to 2005 (road and airstrip watering improved)
- total suspended particulates below Canadian Ambient Air Quality Objectives
- snow and lichen samples show some detectable contaminants closer to the mine



2005 Air Quality Monitoring Program Snow, Lichen, Vegetation and HVAS Monitoring Stations



2002-2005 Results—Air and GHGs

Contaminant	2002	2003	2004	2005
Carbon Monoxide (CO)	522	259	170	154
NOx	2,044	2,985	3,625	2,673
PM—Total Particulate Matter	171	77	46	39
PM 10	171	76	45	37
PM 2.5	Not reported	76	45	37
Sulphur Dioxide (SO ₂)	56	161	148	157
Volatile Organic Compounds	Not reported	200	185	192
GHG Emissions	175,484	214,431	227,315	259,702

All figures calculated in tonnes for the financial year (July 1 to June 30)



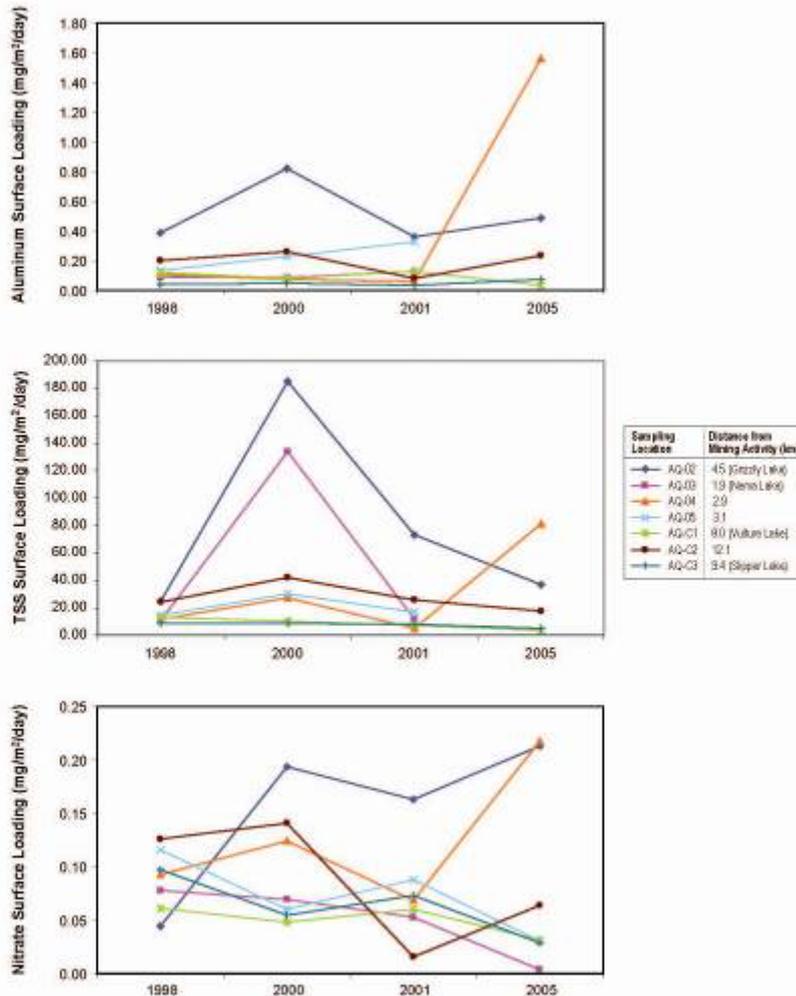
2005 Results—Hi Vol Sampler

- BHPB operating unit at Grizzly Lake but only during the summer (measures Total Suspended Particulates)
- All results within the Canadian Ambient Air Quality Objectives (except on June 17, 2004 due to late dust control measures)



2005 Results—Snow and Lichen

- Snow and lichen sampling was delayed by one year to 2005 to select better sites
- 61 snow samples collected from 56 sites
 - 12 new sites added due to expanding mine footprint
 - 19 sites used as background
- 27 lichen sample sites
 - 10 sites used as background
 - one species sampled rather than a composite as in past years



Sampling Location	Distance from Mining Activity (km)
AG-02	45 (Grizzly Lake)
AG-03	19 (Piano Lake)
AG-04	2.9
AG-05	3.1
AG-01	80 (Wukus Lake)
AG-02	12.1
AG-03	9.4 (Sloper Lake)

Comparison of 1998, 2000, 2001 and 2005 Snow Surface Loading of Aluminum, TSS and Nitrate

FIGURE 3-1



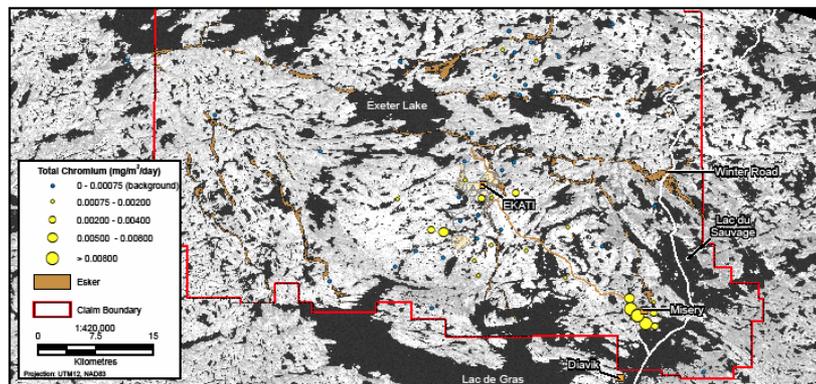
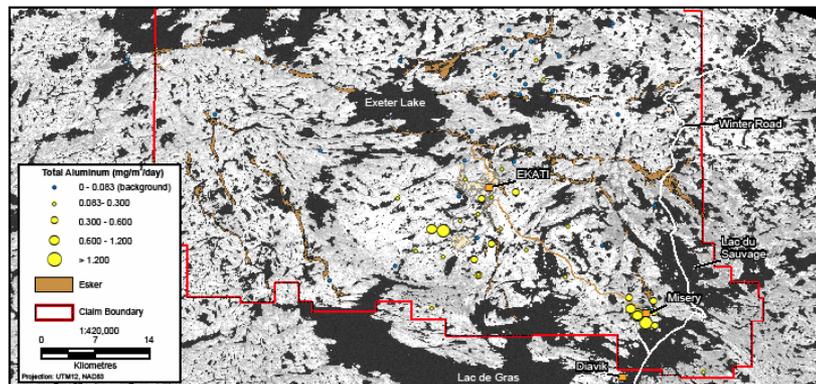
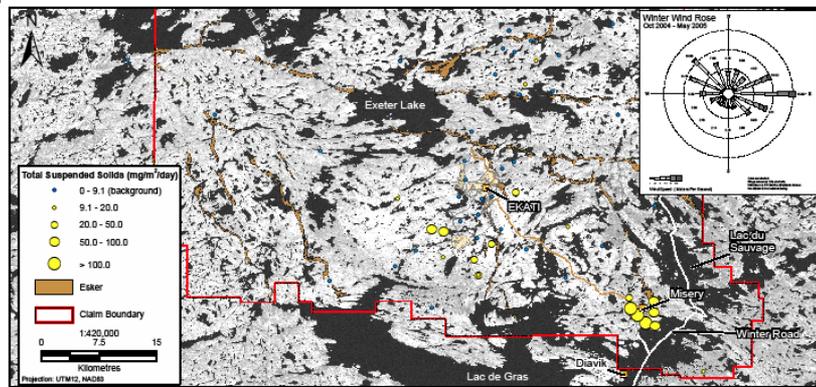
2005 Results— Snow

- Contaminant loads in the snow decrease away from the mine site
- A zone of influence for dust is about 18 km from the mine
- Nitrate and ammonia are carried away from the mine site quickly



2005 Results—Lichen

- Lichen samples closer to the mine have more contaminants, especially for metals
- Lichen a better indicator of total cumulative loadings from dust and other air emissions
- Zone of influence for effects on lichen extends out at least 18 km from the mine



2005 Results— Lichen

Ten metals were found to be significantly higher in lichen closer to the mine site

(Al, Cr, Co, Fe, Pb, Mg, Mo, Ni, Ti, V)



Review of 2005 Report

- Agency hired independent air quality and lichen experts to review the 2005 Air Quality Monitoring Program report and the CALPUFF Air Dispersion Model
- Problems with the methodology, analysis and conclusions
- GNWT and EC had similar concerns



Review of 2005 Report

- High volume air sampler should be run year round
- Need for more snow and lichen sampling sites and better distribution of sites
- Standard snow and lichen sample handling methods should be used
- Current vegetation surveys do not produce meaningful results
- Lichen species sampling should include preferred caribou food



Review of Dispersion Model

- Source emission data from the mine site needs to be improved
- Meteorological data input should be checked
- Chemical transformations of air contaminants not calculated properly
- Modeling work should be extended to include dust and ambient air quality
- Improved model will assist with better design for monitoring programs



BHPB Response to Date

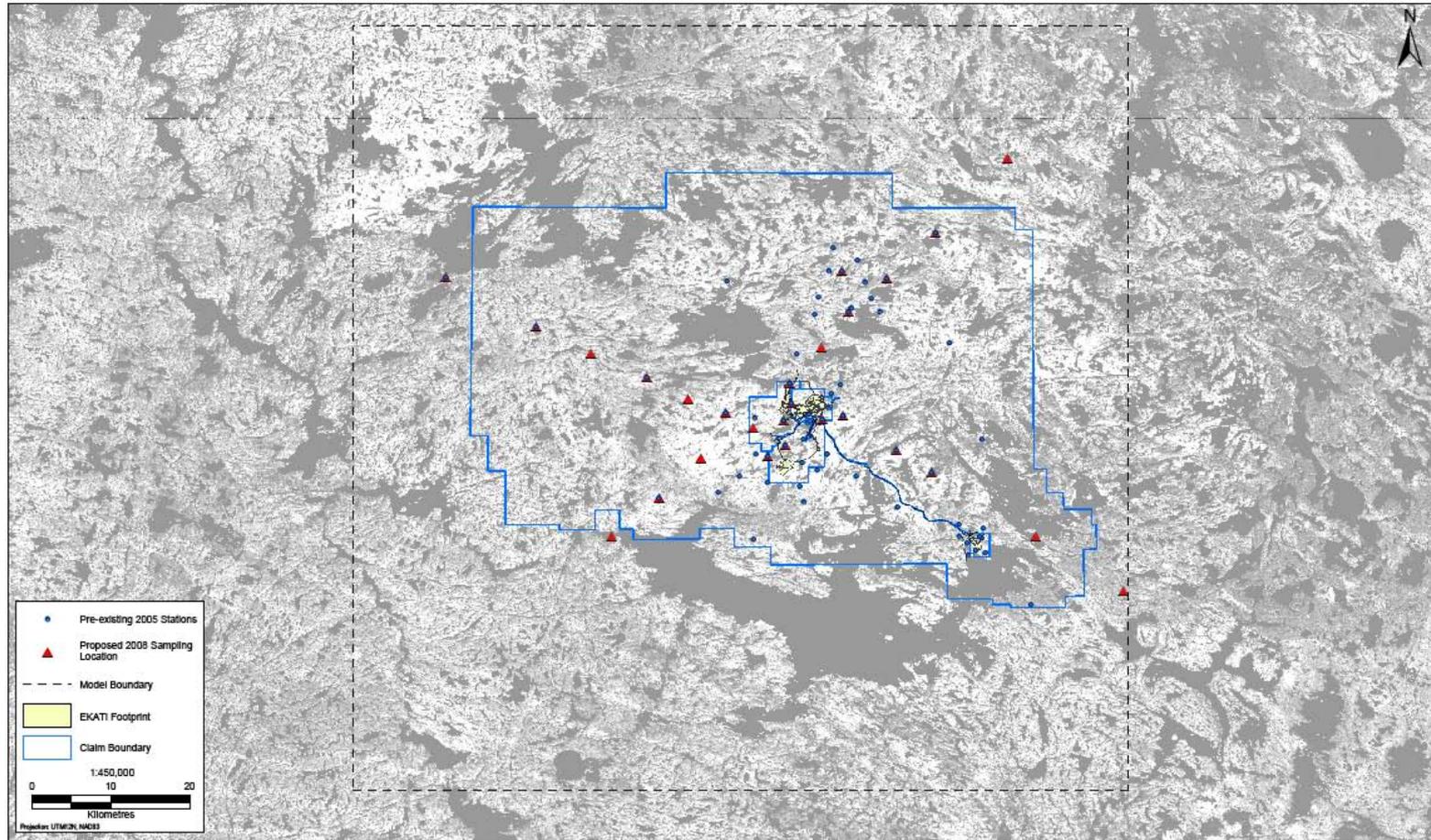
- BHPB acknowledged the need to improve its air quality monitoring program
 - Two technical sessions held on January 15 and April 24, 2008 amongst air quality experts
- BHPB has agreed to new snow and lichen sampling locations to better define zones of influence

BHPB Response to Date

gis no. 820-5-02

Job No. 820-5

January 11, 2008



BHPB Response to Date

- BHPB to recheck calculations of air emissions for VOCs and Dioxins/Furans
- Need for revised Waste Management Plan in light of new incinerator
- New sample sites have been added to the dustfall monitoring program (1000 m from roads to test the impact prediction of the 1995 EIS)
- BHPB will examine year round Hi Vol sampling

Current Incinerator in Operation



BHPB Response to Date

- Locations for the Continuous Air Quality Monitoring Building were discussed
 - BHPB has moved it to a more central place
- BHPB agreed to circulate information on any further proposed changes prior to them going ahead



New Incinerator
Not Yet In Operation



Agency Assessment

- Agency, GNWT and EC are pleased with recent progress
- BHPB should consult with Aboriginal communities about changes to the Air Quality Monitoring Program
- BHPB should investigate linkages among the different monitoring programs
 - ambient air quality and dust monitoring to the potential effects on lichen and caribou



Agency Assessment

- BHPB should get the new incinerator operating
 - with proper training of its staff
- BHPB should revise its 2003 Air Quality Management and Monitoring Plan to formalize recent commitments and changes
 - BHPB just agreed to revise the Plan by March 31, 2009