Valued Component – Air Quality (FINAL DRAFT)

STATE OF KNOWLEDGE – WHAT IS HAPPENING?

A very brief overview of the state of knowledge with respect to air quality in the NWT is presented below. This overview is preliminary and not intended to be exhaustive.

↪ What are the baseline conditions with respect to air quality?

✻ Generally air quality in the NWT is considered to be pristine and near or at natural background levels. Near anthropogenic emission sources such as communities and industrial developments, air pollutant levels can be elevated above background levels.

✻ Community emission sources include power generation, residential and commercial heating, transportation and incineration of waste. Peak pollution concentrations occur in the springtime due to fugitive dust from roads and during temperature inversions on cold winter days that trap pollutants near the surface.

✻ Mining emission sources include power generation, mine fleet and ore processing. Air quality modelling completed during Environmental Assessments indicated that there is potential for local air quality impacts. Primary particulate matter (dust) appears to be main concern. Most mines have or are developing an air quality monitoring program. Ongoing modelling studies are investigating cumulative impacts from mine emissions to regional air quality.

KEY MONITORING INDICATORS

Ambient Air Concentrations:

Sulphur Dioxide (SO_2)
Nitrogen Oxides (NO_x)
Hydrogen Sulphide (H_2S)
Total Suspended Particulate (TSP)
Particulate Matter (PM_{10} & $PM_{2.5}$)
Ground-level Ozone (O_3)
Carbon Monoxide (CO)

Air Emissions:

Mercury, Dioxins, Furans
SO_2, NO_x, H_2S, CO,
TSP, PM_{10}, $PM_{2.5}$

Atmospheric Deposition:

Potential Acid Input(PAI)

✻ Oil and gas emission sources include flares, power generation, compressors, line heaters, pump jacks and dehydrators. The potential for air quality impacts depends on the size and location of the facility, the composition of the gas or oil being extracted and the type of fuel used at the facility. Air quality modelling completed during Environmental Assessments indicated that there is potential for local air quality impacts. At facilities where monitoring is conducted, exceedences of air quality standards have occurred.

✻ Incineration of medical waste and remote work camp waste has the potential to release mercury, dioxins and furans into the environment through air emissions and residual ash. The Canada-wide Standards (CWS) for Dioxins and Furans and the CWS for Mercury emissions produced by the Canadian Council of the Ministers of the Environment (CCME) apply to incineration in the NWT.

✻ Smoke from forest fires can greatly affect local and regional air quality. Forest fires can cause high concentration levels of particulate matter (PM_{10} and $PM_{2.5}$) and can significantly

impact visibility. Most exceedances of air quality standards in the NWT are linked to forest fires.

RECENT AND CURRENT MONITORING

Ongoing monitoring programs with respect to air quality in the NWT are found below.

✓ The Government of Northwest Territories, with support from the Federal Government (National Air Pollution Surveillance [NAPS] Program), operates 6 air quality monitoring stations in the NWT. Data from 4 of these stations is available on a real time basis at the Environment and Natural Resources web site at: http://lisin.rwed-hq.gov.nt.ca/NWTAQ/NetworkSummary.aspx along with historical data from all of the monitoring stations. Annual data summaries can also be found on the ENR web site.

- Yellowknife NAPS station measures SO_2, NO_x, O_3, CO, TSP, PM_{10} and $PM_{2.5}$ and meteorology
- Inuvik NAPS station measures SO_2, H_2S, NO_x, O_3, CO, PM_{10}, $PM_{2.5}$ and meteorology
- Fort Liard ENR station measures SO_2, H_2S, NO_x, O_3, PM_{10}, $PM_{2.5}$ and meteorology
- Norman Wells GNWT station measures SO2, H2S, NO_x, O_3, PM_{10}, $PM_{2.5}$ and meteorology
- Snare Rapids CAPMoN stations measures wet acid deposition and the composition of precipitation (rain and snow).
- Daring Lake ENR station measures TSP, PM_{10} or $PM_{2.5}$ during the summer

✓ Upper air monitoring program (Environment Canada). Balloons are released twice a day to measure upper air meteorology. Although these instruments do not measure air quality, upper air meteorology is an important input for air quality modelling. In the NWT, upper air monitoring sites are located at Fort Smith, Norman Wells and Inuvik. An upper site in Bake Lake, NU, may also be useful to NWT air quality modelling.

✓ Current industrial air quality monitoring programs

- Ekati diamond mine is sampling TSP and conducts snow and vegetation surveys. The monitoring program is currently under review and will likely add PM10 and PM2.5 monitors.
- Diavik diamond mine monitors dustfall.
- Snap Lake diamond mine currently monitors TSP, PM10 and PM2.5.
- Paramount Cameron Hills Oil And Gas development monitors continuous SO_2, NO_x, and H_2S

GAPS AND RECOMMENDATIONS FOR MONITORING

A list of monitoring gaps and recommendations for future monitoring under the NWT Cumulative Impact Monitoring Program is found below.

Gaps

➙ Lack of cumulative regional air quality monitoring in the diamond mine region

➙ Lack of NWT specific air emission inventory

➙ Lack of incineration inventory for remote camps

Recommendations

➙ Establish a new air quality station downwind of the diamond mines. Data from this station could used to determine the cumulative impacts from mine activities on regional air quality.

➙ Develop NWT air emission inventory

➙ Develop incineration inventory for remote camps.

REFERENCES

Relevant monitoring reports, past monitoring programs, research documents, and scientific publications are found below.

*Canadian Council of the Ministers of the Environment**, Canada-wide Standards for Dioxins and Furans**, 2001*
(http://www.ccme.ca/ourwork/air.html?category_id=91)

*Canadian Council of the Ministers of the Environment**, Canada-wide Standards for Mercury Emissions**, 2000*
(http://www.ccme.ca/ourwork/air.html?category_id=87)

Government of the Northwest Territories. ***Air Quality Monitoring Network.***
Real-time and historical ambient air quality monitoring data available at:
http://lisin.rwed-hq.gov.nt.ca/NWTAQ/NetworkSummary.aspx

Government of the Northwest Territories. ***Northwest Territories Air Quality – Annual Reports****. (1989-2005).*
Current (2005) Annual Report is available at:
http://www.enr.gov.nt.ca/eps/environ.htm
under 'Air Quality Program