

AIR QUALITY TRENDS IN THE SUDBURY AREA 1953-2002

Potvin Air Management
Consulting

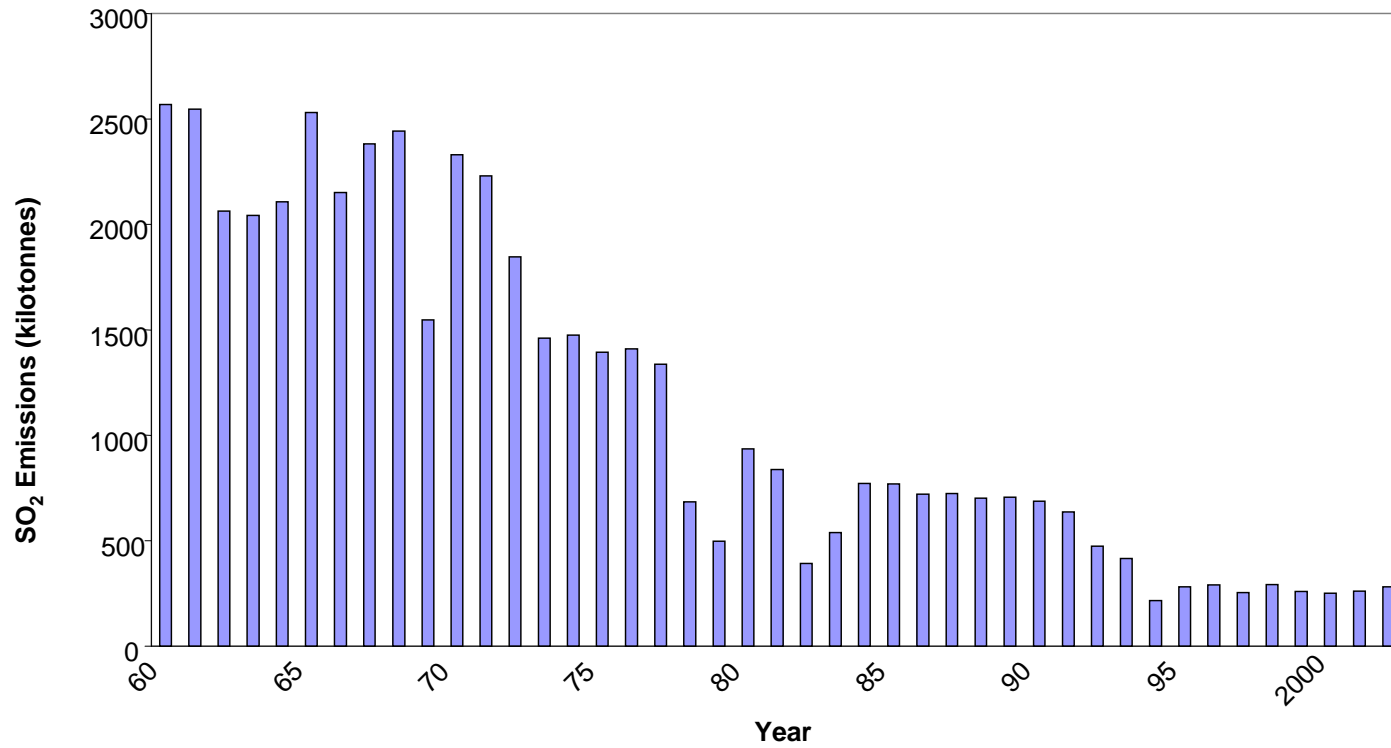
Sudbury 2007 Conference on Mining and the
Environment (Oct 2007)

- Report (2004) for Clean Air Sudbury Committee
 - Available (pdf) at:
 - www.greaterSudbury.ca/cleanairsudbury
 - Covers all air quality parameters (except metals)
 - Report to be updated in 2008 for CAS with data to 2006
- Manuscript available from conference proceedings for this presentation

- Sulphur dioxide (SO₂)

- Combustion of S bearing substances
- Transformed to SO₃, sulphuric acid, sulphate aerosols, acid deposition
- Majority (> 66%) SO₂ emitted in Ontario from utilities, smelters, petroleum refineries; other sources (steel mills, pulp/paper mills, space heating, transportation)
- Smelters accounted for 44% of Ontario emissions (2001)
- Smelters account for > 99% of Sudbury emissions (1995)
- Effects (vegetation, respiratory illnesses, acid rain, corrosion, reduced visibility)
- Ontario AAQC = 250 ppb (1 hr), 100 ppb (24 hrs), 20 ppb(1 yr)

Fig. 1: Sulphur Dioxide Emissions from Sudbury Area Smelters (1960-2002)



Air Quality Trends and Provincial Perspective

- Sulphur dioxide
 - Emissions and abatement efforts
 - Emission trends (Fig. 1); 88% decline (1960-65 vs 99-2002)
 - Abatement efforts (industry/gov't)
 - Well documented
 - 2007 limit: 241 kt (currently 365 kt)
 - Supplementary controls
 - Smelter production/emission reductions to meet short term ground-level concentration limit
 - » 0.5 ppm (78-2002); 0.34 ppm (2002-2014);
 - » 0.30 ppm 30 min. std (2015)

Fig. 2 Air Quality Monitoring Network in the Sudbury Area (1953-1970)

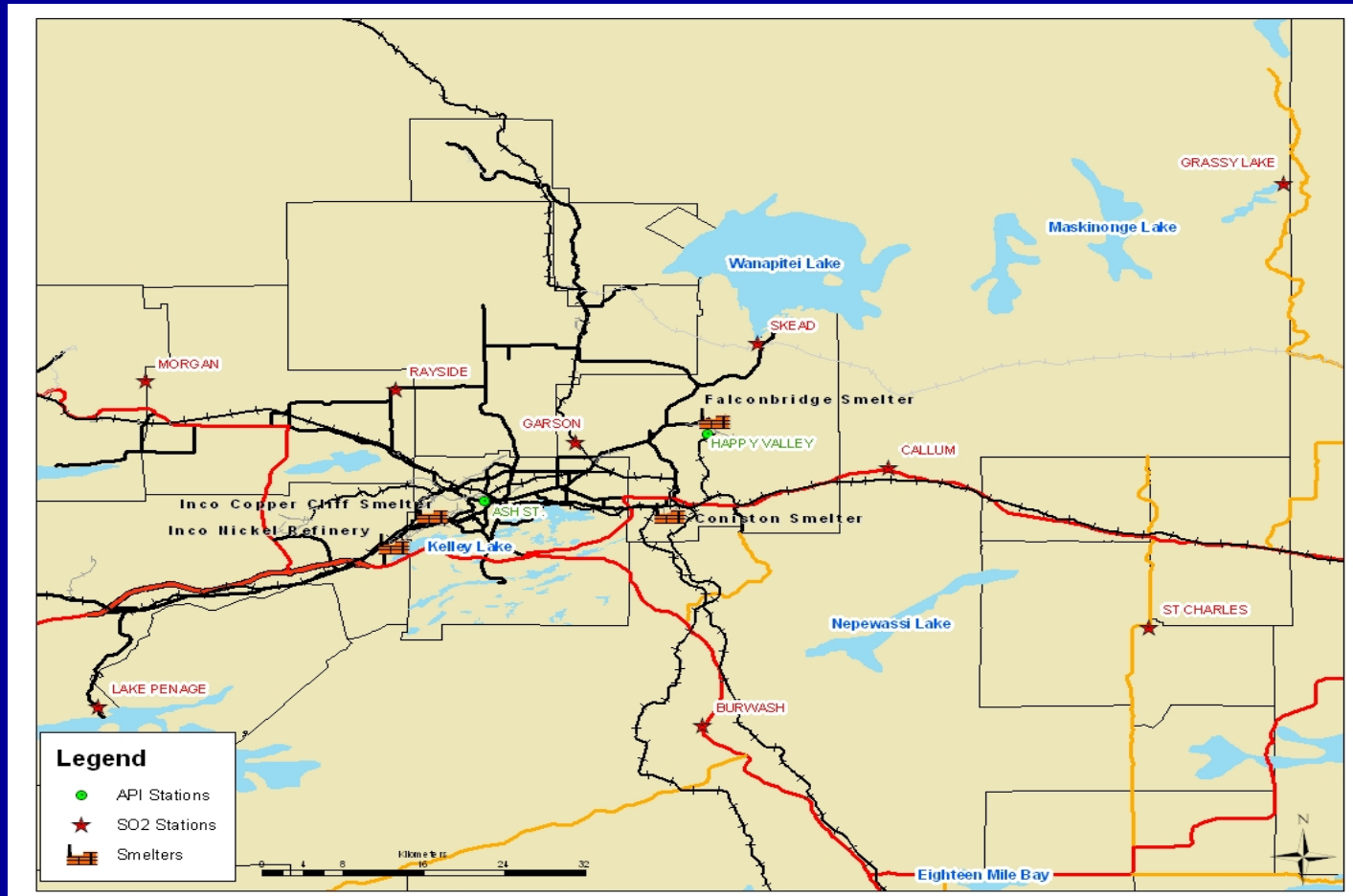


Fig. 3 Air Quality Monitoring Network in the Sudbury Area (2002)

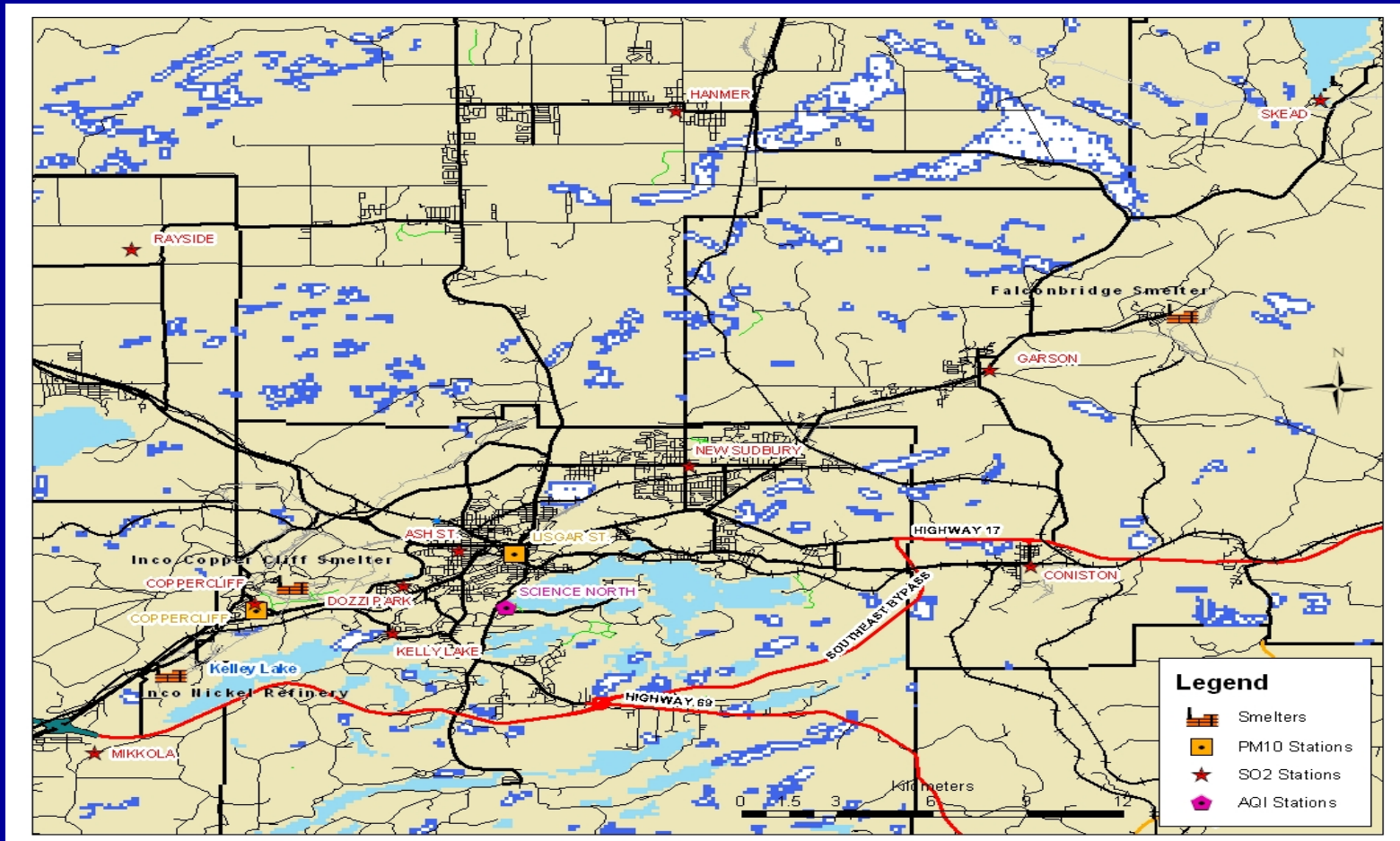


Table 1: Range of Maximum 1-Hour Values and Exceedance Frequency of the 1-Hour and 24-Hour SO₂ Criteria From 1953 to 1969

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- **Location**
- **Maximum**
- **1 hour (ppb)**
- **# of Times Above Criteria**
- **1-hour**
- **24-hour**
-
- Lake Penage 330 – 1330 4 – 54 0 – 8
- Burwash 390 – 1130 6 – 72 0 – 7
- Skead 1110 – 3570 102 – 328 13 – 41
- Garson 840 – 1940 50 – 219 4 – 26
- Grassy Lake 190 – 1240 0 – 31 0 – 2

**Fig. 4: Mean SO₂ Concentrations in the Sudbury Area
1967-1971 and 1973-1977)**

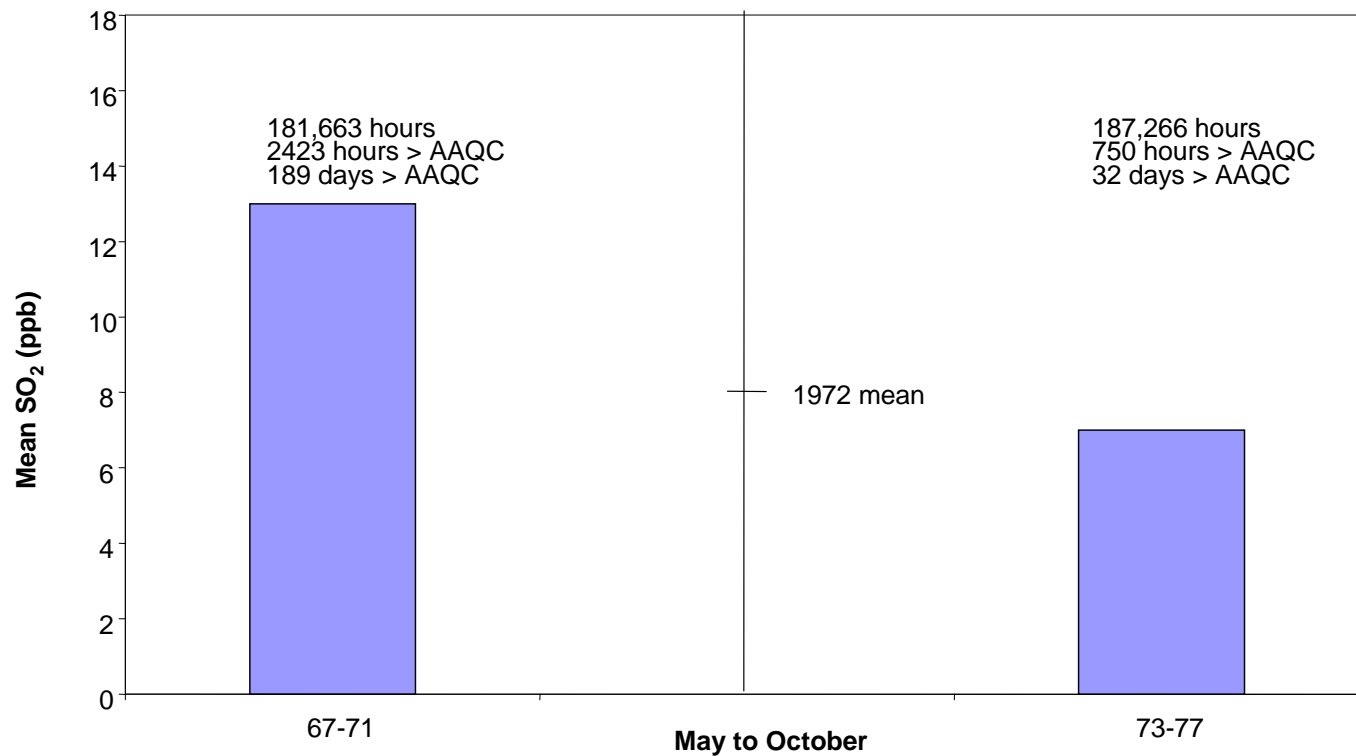


Figure 5: Exceedance Frequency of the SO₂ AAQCs at Skead and Garson

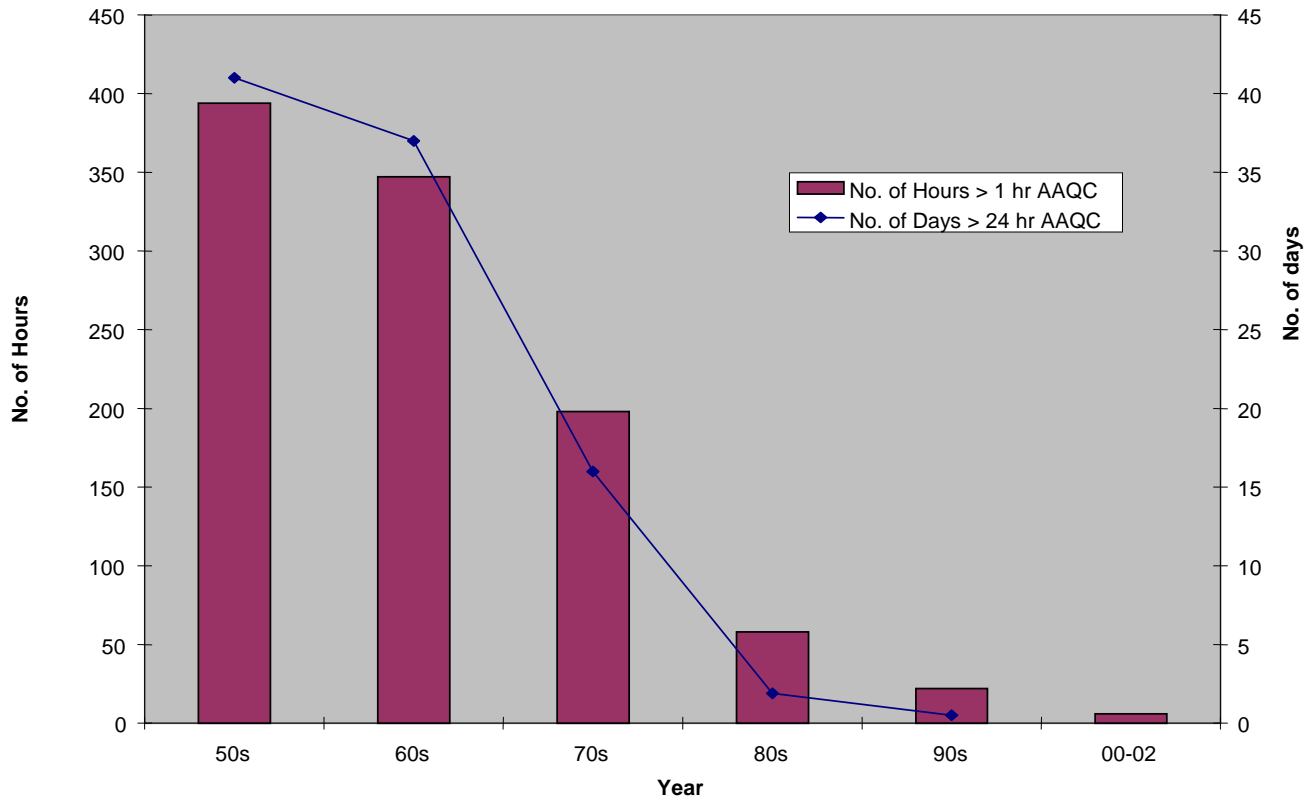


Fig. 6: Mean SO2 Concentrations at Ash Street in Sudbury

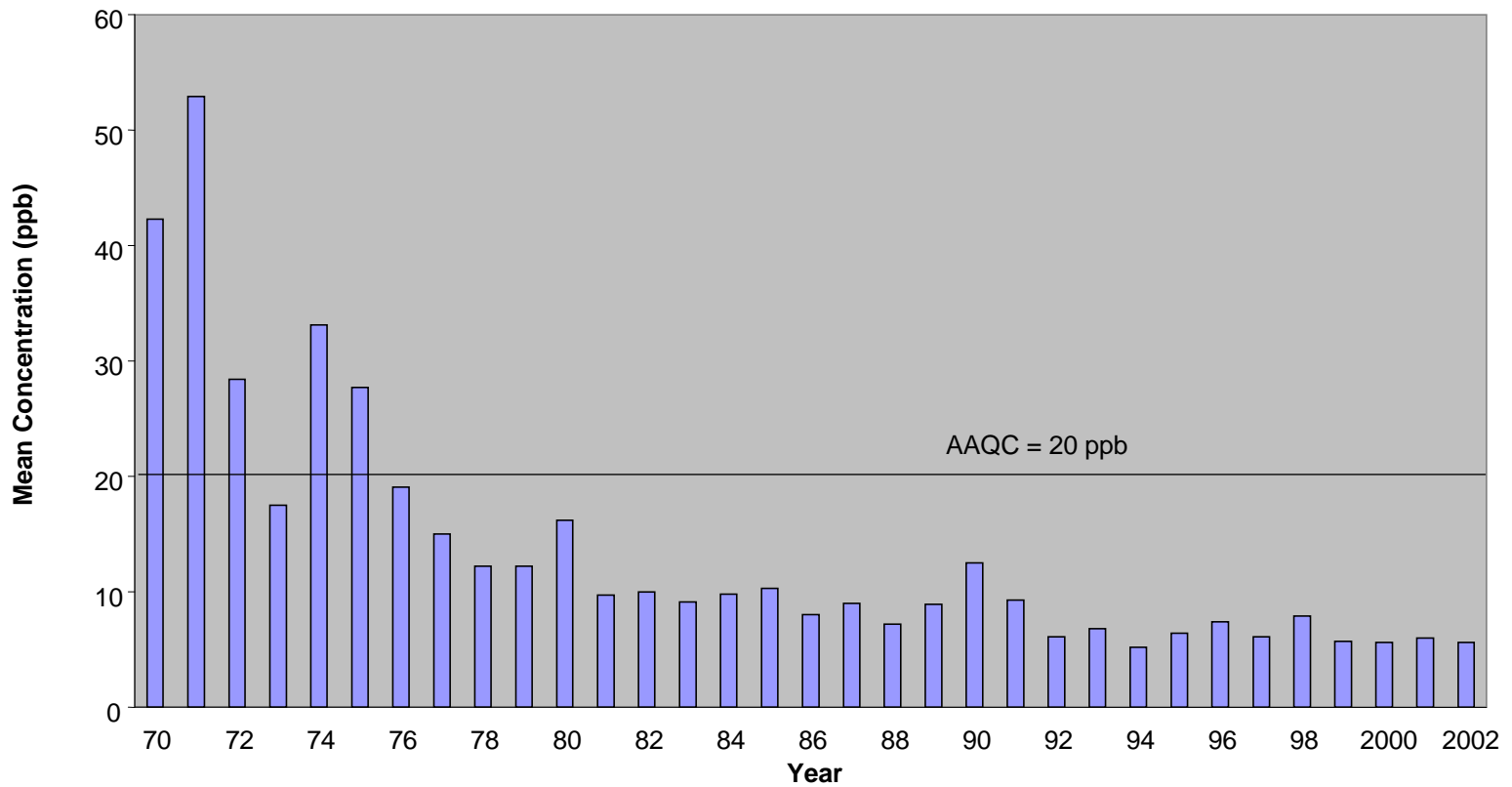


Fig. 7: Mean SO₂ Concentrations in the Sudbury Network and in Copper Cliff

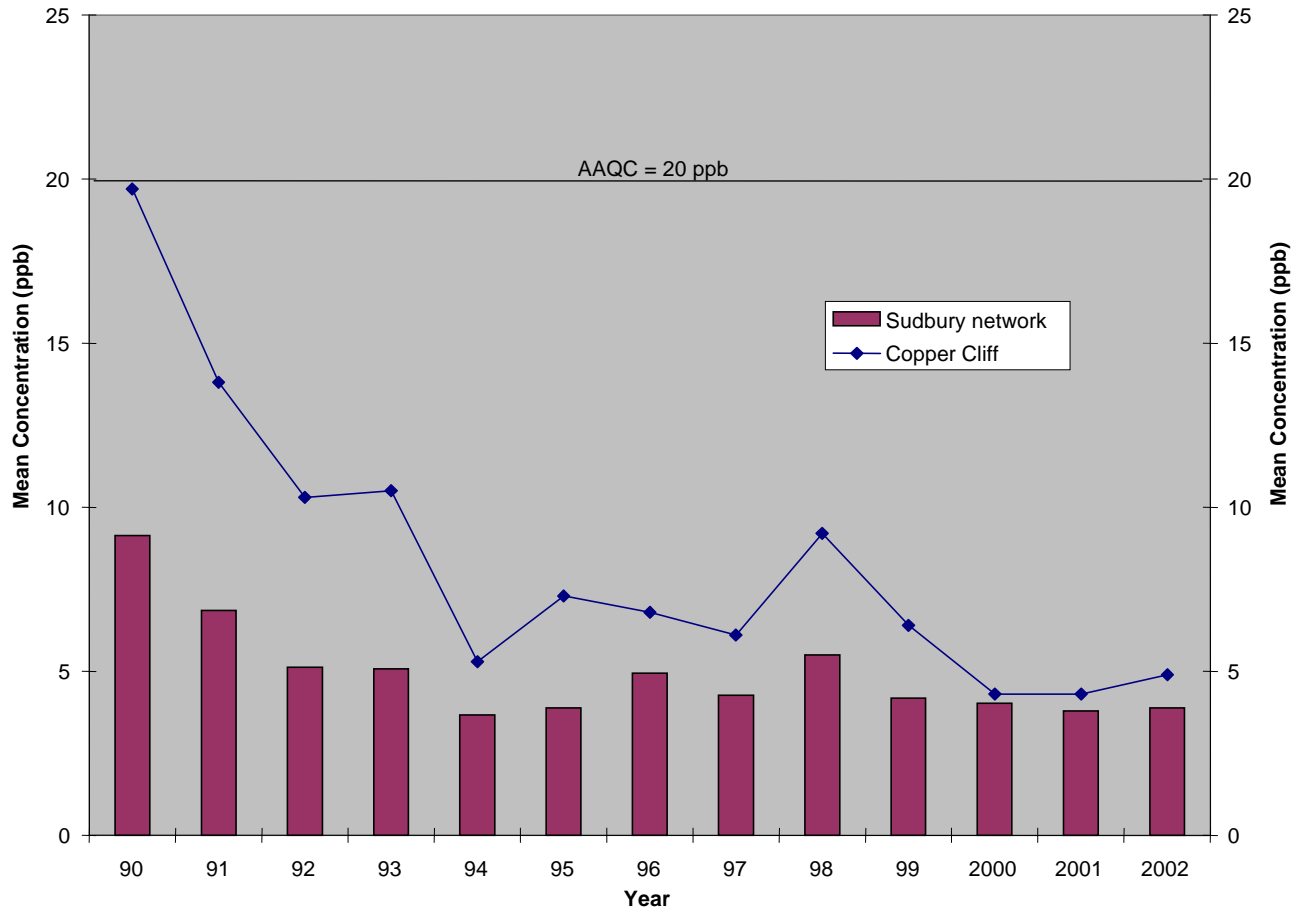


Fig. 8: Frequency of Exceedance of the SO2 AAQCs in Sudbury

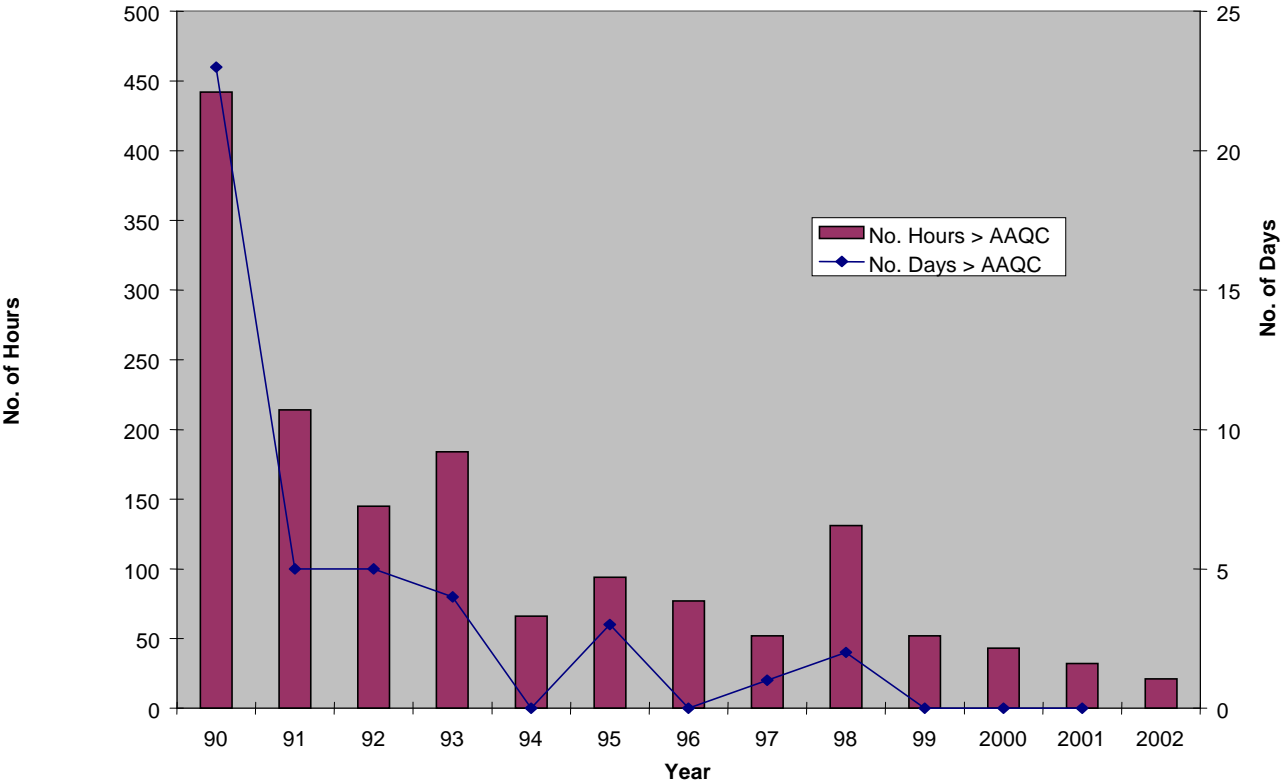


Fig. 9: Mean SO₂ Concentrations in Selected Cities (1990-2002)

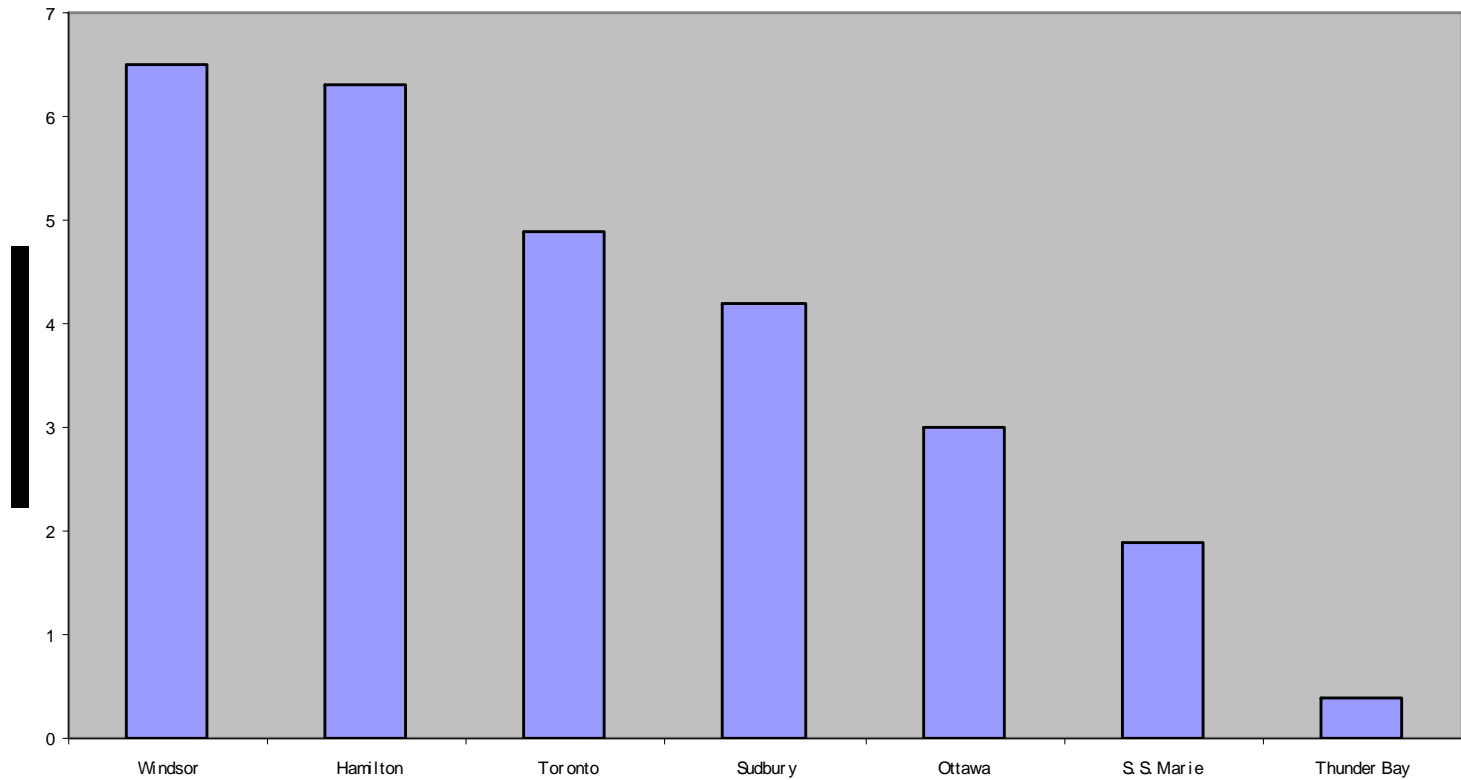


Table 2: AQI Contaminants Responsible for Moderate to Poor Air Quality in Sudbury from 1989 to 2001

AQI Contaminant	Parameter Resp. For Moderate to Poor Air Quality	Parameter Resp. For Poor Air Quality
O3	97.5%	85%
SO2	1.6%	15%

Sudbury only city to record AQI > 31 due to SO₂