



# Royal Oak Mines Inc.

## Memorandum

**To:** Ed Szol, COO      cc. J. Stard, Giant Mine Manager  
S. Schultz, NWT Environmental Coordinator  
N. Deshaw, Corporate Council

**From:** Richard Allan ✓

**Date:** December 9<sup>th</sup>, 1997

**Subject:** Meeting with Environment Canada re: Air Emissions

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### Introduction:

On December 4<sup>th</sup>, the author and S. Schultz met with Laura Johnston (Manager - Environmental Protection Branch, NWT) and Ed Collins (Chief, Environmental Engineering) from Environment Canada. The meeting was held to discuss the status of air emissions at the Giant Mine and the potential new regulations regarding these emissions.

It was intended that at this meeting the parties could discuss the opportunity for regulated levels to be negotiated, including a timetable for implementation.

### General:

Environment Canada (EC) and the GNWT are concerned about arsenic and sulphur dioxide emissions from Giant's roaster. EC is primarily interested in arsenic, while the GNWT appears more interested in sulphur dioxide. The workshop on arsenic emissions to the environment, held in July of this year, was the most recent step in developing an understanding for the issues and developing guidelines or regulations.

The GNWT was not invited to the meeting on Dec. 4<sup>th</sup>, as it was intended more as an exploratory meeting, from which future sessions could be organized.

EC is just now receiving feedback from other regulatory agencies on the workshop and proposed regulations. They have not as yet received direction from the Federal Minister.

S. Schultz presented the most recent stack test data (attached), which indicates a low arsenic emission of 4.1 kg/day and sulphur dioxide emissions of 30 tonnes/day. These

levels are similar to the last measurements (1995) and are generally lower than expected. At these levels the emissions issue becomes less severe, as far as EC is concerned.

It has been suggested that these levels are indicative of improved operation and maintenance of the baghouse and a general reduction of arsenic and sulphur in the feed. These facts will need to be substantiated through analysis and comparison with relevant data such as maintenance records and feed assays.

The measurement of arsenic emission may be in question as the last 2 (performed by EnTech Environmental) are an order of magnitude less than historical records (prior to 1995) would indicate. This should be checked by another contractor or by different methodology (if practical).

Future regulations will be based on gas concentrations of arsenic (eg. mg/m<sup>3</sup>), and mass emissions of sulphur dioxide (eg. tonnes/day).

#### **Negotiated Agreement or Regulations:**

ROM has an opportunity to negotiate an agreement to reduce air emissions over a period of time, or it can wait until new regulations come into law and then attempt to comply. Such new regulations could be in place in about one years time, if the agencies (EC and GNWT) become very serious about doing so.

A negotiated agreement would predate the 'inevitable' regulation and allow ROM to be up front and lead, rather than be forced into compliance.

Any negotiated standards would still have to be consistent with Federal and Territorial guidelines and therefore would not be a 'special' case, the goals would be the same, the path a little different.

If ROM volunteers to enter into negotiation of an agreement it would have input to the target emission levels and have an opportunity to develop an implementation schedule. In the case of a negotiated agreement there is an opportunity to include economic criteria, which would influence compliance considerations over the life of the agreement.

The suggested sequence of events in entering into negotiation as derived from this meeting's discussions, would be as follows:

- ROM prepares a presentation for EC regarding the relevant data, and supporting information, prior to the Water Board hearings in late January. This meeting may alter the submission made to the Water Board by EC (suggested by L. Johnston).

- A second air emissions workshop would be held in February 1998, involving regulatory agencies and interest groups. This workshop would consider both arsenic and sulphur dioxide. ROM would present its data, technical experts would contribute as required, and the workshop proceeds, with the intention to develop a common understanding of the issue, and assist in developing guidelines and goals. Agencies with a serious concern and wanting to participate in negotiations with ROM, or drafting regulations, would be identified at this time. It is hoped that EC and GNWT will be responsible for further work.

- Negotiations between ROM and EC / GNWT would proceed independently, after the workshop. These negotiations would be closed sessions involving no more than four individuals from each side. If an agreement can be reached, it is expected to be quick (several months?). If an agreement cannot be reached after a period of time, then new regulations will be the only course of action available to government agencies, and that process would take its own course.

#### **Proposed Action Plan:**

The following steps should be taken in preparation for negotiations, which are expected to be the best solution to this issue.

1. Organize emission data for presentation, in the form (units) that government agencies can readily interpret, and intend to use to develop regulations.
2. Establish key historical information that corresponds to changes in the measurements during the history of the mine.
3. Determine that the latest readings are accurate, and/or schedule a new test to confirm. These readings should be compared to mass balance calculations. The low arsenic measurements are of the greatest concern.
4. Compile reports regarding the roaster operation, dispersion modeling, etc. and write a summary report clearly identifying the options for reducing stack emissions.
5. Make a presentation to EC and GNWT prior to the Water Board hearings. The discussion at this meeting will provide a framework for future work, and either negotiations or imposed regulations.

At time of writing the report from EnTech is being reviewed and the contractor will be contacted to discuss methodology and confidence levels. Alternate sampling methods will also be discussed.

Although no firm plan has been prepared, the writer and S. Schultz are making plans to have a presentation ready for mid-January.

Please forward comments so that the action plan can be firmed up and initiated.

A handwritten signature in cursive script, appearing to read "Rich", is located on the left side of the page.

# Royal Oak Mines Inc. - Giant Mine Air Emissions, 1959 to 1997

YEAR	Estimated Arsenic Emission Rate (Kg/day)	Estimated Sulphur Dioxide Emission Rate (tonne/day)
1949	7300	
1950	7300	
1951	7300	
1954	5500	
1955	2900	
1956	2700	
1957	3000	
1958	1500	
1959	52	
1960	75	
1961	150	
1962	150	
1963	150	
1964	310	
1966	240	
1967	130	
1968	230	
1969	300	
1970	220	
1971	880	
1972	400	
1973	400	
1974	220	
1975	215	
1976	165	
1977	135	
1978	26.1	
1979	14.6	
1981	13.2	
1982	13.2	
1983	27.0	32.2
1985	27.1	
1986	24.3	
1988	208.9	
1989	26.4	
1990	37.1	35.0
1991	33.4	66.2
1993	29.2	
1995	3.2	30.9
1997	4.1	29.1

*- new roaster + baghouse*

*- ? mill expansion*

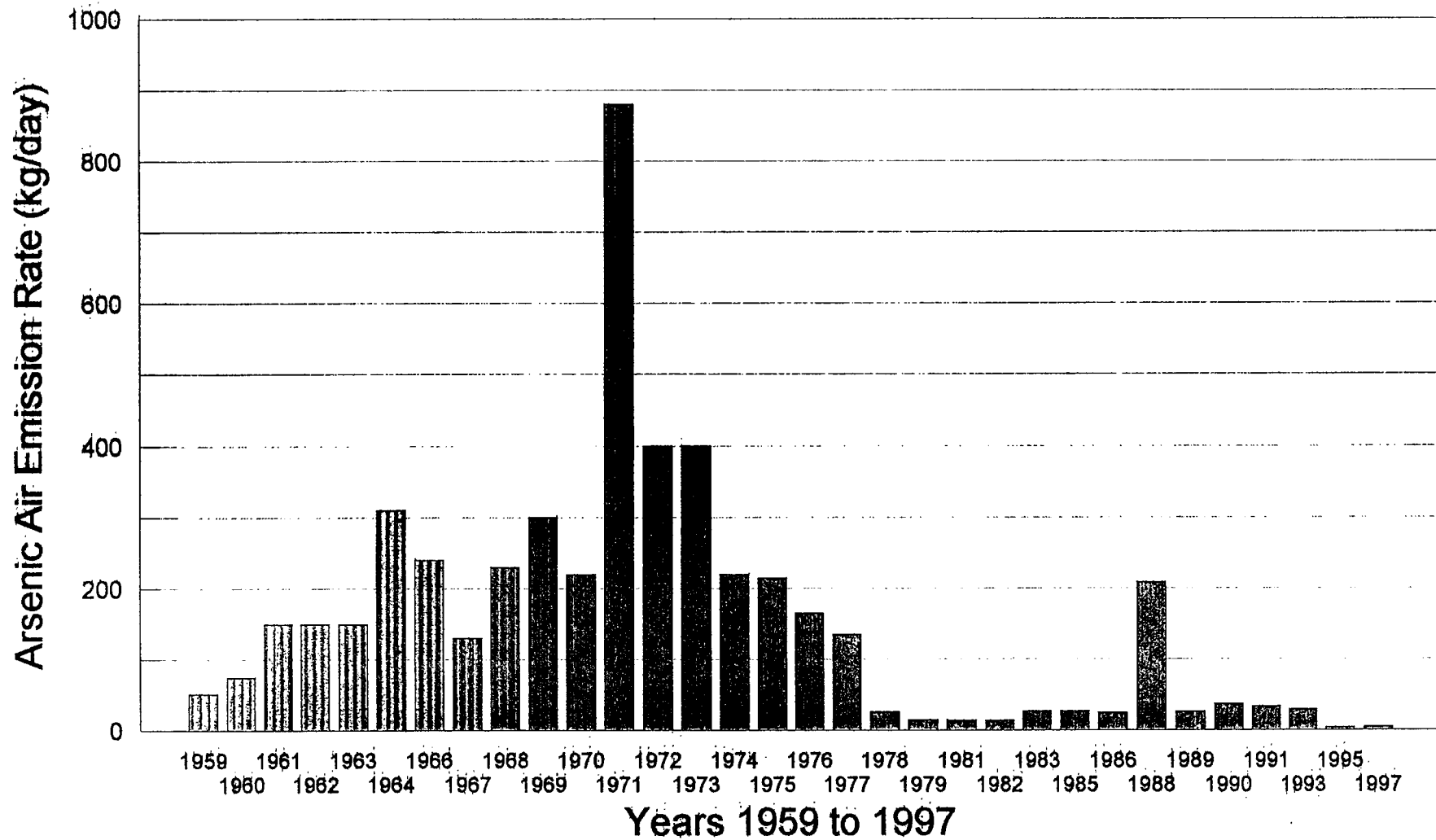
*- pressure drop method to initial shaking  
as opposed to timing*

*} why so low*

- NOTES:** (1) Arsenic emission rates from 1959 to 1978 estimated by mass balance  
(2) Arsenic and SO2 emission rates from 1978 estimated from stack testing, conducted by Royal Oak, Environment Canada & contractors  
(3) Emission rates for some years are average of multiple stack test results

# Arsenic Air Emission Rates

Royal Oak Mines Inc. - Giant Mine 1959 to 1997



1959 to 1977 Emissions estimated by mass balance. 1978 to 1997 Emissions measured by stack testing.