

C.E.M.S. file

# Memorandum

ROYAL OAK MINES INC., ENVIRONMENTAL SERVICES

**to:** John Stard, Mine Manager - Giant

**from:** Stephen Schultz, Environmental Superintendent

**cc:**

**date:** October 14, 1997

**subject:** Environmental Costs - 1998 Budget, Giant Mine

The following **regular expenditures** are associated with environmental protection, but are budgeted under the operating budgets of the Mine and Mill departments:

ACTIVITY	DEPT.
1) Regular water quality monitoring (SNP)	Mill
2) Geotechnical Inspections of dams (\$4,500 p.a.)	Tech Services
3) Tailings Containment Area maintenance (Repairs to dams, pipeline, seepage stations)	Mill
4) Operation of Effluent Treatment Plant	Mill

The following **irregular environmental expenditures** are required in 1998:

1) **Continuous Emissions Monitoring System for Sulphur Dioxide**

We have purchased the system from Rosemount Instruments at a cost of \$85,581. We will have additional installation and commissioning expenses in 1998 (or late 1997), as follows:

Installation (materials for installing probes on stack, sample line, heated enclosure for analyser)	\$ 5,000
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Software (For analysis of data, calibration etc.)	\$10,000
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Identify computer to be used.

Calibration gases	\$ 2,500
Commissioning & Training assistance	\$15,000
Certification by G.N.W.T. (Manual stack sampling)	\$10,000
<b>TOTAL C.E.M.S. system installation &amp; commissioning</b>	<b>\$42,500</b>

2) **Tailings Pond Dust Suppression**

Numerous requests have been made by the Water Board, the GNWT and DIAND over the last several years that this issue be addressed. It will certainly be raised at the licence renewal public hearing. The cheapest short-term solution will probably be the application of a synthetic dust suppressant to the most exposed areas of dry tailings.

<b>Application of dust suppressant</b> (To 25 acres of the North Pond)	<b>\$13,500</b>
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3) **Installation of deep thermistors in the tailings deposit**

As the next stage of the required study of permafrost in the tailings deposits, we need to drill a deep hole into the tailings (10-20 feet) and install thermistors to monitor permafrost conditions. This information will provide us with an estimate of the volume of unfrozen tailings that may release contaminants after mine closure and the cost of water treatment required after closure. Laboratory test work is required to determine if the tailings solids contain significant levels of soluble contaminants.

<b>Thermistor installation in tailings</b>	<b>\$ 3,000</b>
<b>Laboratory test work on tailings material</b>	<b>\$ 4,000</b>

4) **Revegetation tests on tailings deposits**

This is a vital part of our planned restoration activities for the mine and control of tailings erosion during operation. We do not know what re-vegetation methods will work, or what they will cost. We need to establish test plots on the South Pond to evaluate alternative methods and plant types.

<b>Re-vegetation test plots</b>	<b>\$12,000</b>
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5) **Removal, disposal or restoration of contaminated soils**

There are a number of identified sites on the property with extremely elevated levels of arsenic and hydrocarbon contamination. We are expected to restore these sites while the mine is in operation so that they no longer pose a threat to the environment. We reduce our liability by cleaning these sites up before the contaminants migrate into clean soils.

**Removal, disposal or restoration of contaminated soils      \$15,000**

6) **Stack sampling for arsenic emissions**

In order to reduce public and government concern over arsenic air emissions, we should measure emissions on an annual basis, using an experienced contractor. This cost for 1998 is covered under the C.E.M.S. system certification, listed earlier.

7) **Surface Contamination Study**

This required study has not been completed to the satisfaction of the Water Board. New control sites will have to be sampled and analysed, and some further laboratory test work on the chemical nature of arsenic present at contaminated sites will have to be completed, in order to negotiate remediation criteria and minimize our liability.

**Sampling and lab test work      \$ 5,000**

8) **Environmental Office costs (NWT Division)**

**Publications, maps, photographs, presentations, travel      \$ 5,000**

**TOTAL ANTICIPATED ENVIRONMENTAL COSTS, 1998      \$100,000**  
(outside of mill and mine operating budgets)