



**Royal Oak
Mines Inc.**

FAX TRANSMISSION

TO: Brenda Moir - CANMET
FAX: (613) 947-0983
FROM: Larry Connell
DATE: October 5, 1998
PAGES: 2, INCLUDING THIS COVER SHEET

IF ALL PAGES ARE NOT RECEIVED, CALL THE OPERATOR AT (425) 822-8992

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Please find attached the executed acceptance page for CANMET MMSL Proposal/Contract 601903 covering the a program of investigation into the recovery and purification of arsenic trioxide produced at Royal Oak's Giant Mine.

The signed copy of the full document is being sent to you today by courier.

Regards
Larry Connell

A handwritten signature in black ink, appearing to read 'Larry Connell', is written over a large, stylized, handwritten letter 'S'.

Acceptance:

By approval hereof, the undersigned acknowledge and hereby accept the terms and conditions of this agreement.

CANMET

COMPANY

Signature

Henry F. Steep for

Name

R.N. Hargreaves

Title

Director

Laboratory

CANMET-Mining and Mineral
Sciences Laboratories

Date

September 23, 1998

Signature

Edmund S. C.

Name

EDMUND S. C.

Title

COD

Division

ROYAL OAK MINES

Date

October 2, 1998

Please return one signed copy to:

Brenda Moir, Contracts Officer
Business and Administration Services
CANMET - Mining and Mineral Sciences Laboratories
Room 126, 555 Booth Street
Ottawa, Ontario K1A 0G1
Fax: (613) 947-0983

Title**Recovery and Purification of Arsenic Oxide - Giant Mine****Objectives**

To study the recovery and production of arsenic oxide (As_2O_3) from the arsenic-rich dust produced and stored at the Giant Mine, Yellowknife.

Background

The Giant Mine of Royal Oak Mines Inc. operates a gold recovery circuit consisting of flotation, concentrate roasting and cyanide leaching. During the roasting operation, arsenic oxide and other compounds are volatilized and recovered in electrostatic precipitation and baghouse systems. During some 50 years of operation, this dust has been stored underground in vaults formed in the rock, and the current inventory amounts to 260,000 tons of dust, containing an average grade of 76% As_2O_3 and 0.54 opt Au. Royal Oak, in collaboration with the Department of Indian Affairs and Northern Development, is currently considering options to reduce or eliminate the potential environmental impact of the arsenic-rich dust, including the metallurgical reprocessing of the dust to recover a purified arsenic oxide product for the wood preserving industry.

One approach under investigation involves leaching with hot water to dissolve As, removing Sb and other impurities from solution, and recrystallizing purified As_2O_3 . However, testwork carried out by Royal Oak showed that the dissolution of arsenic from the dust was lower than predicted and that Sb and other impurities must be removed from solution prior to crystallization to avoid contamination of the product. Another option being considered involves subjecting the dust to controlled heating in order to promote the vapourization of As_2O_3 . In this context, CANMET has been asked to investigate, in an exploratory manner, the following points: the parameters controlling the solubility of As_2O_3 in water, the mineralogy of the dust, the amenability of As_2O_3 to selective vapourization and the removal of Sb and Fe from the leach solutions by ion exchange.

Benefits

Royal Oak would gain useful information about the feasibility of recovering a marketable arsenic oxide product. This in turn may lead to a permanent solution to the arsenic dust problem, thus reducing or eliminating an environmental concern for the inhabitants of the area surrounding the Giant Mine.

4) Ion exchange:

Based on the work already carried out by Royal Oak, screening tests will be done using using four adsorbents: three resin samples and one activated carbon sample chosen by Royal Oak and one resin sample chosen by CANMET. The screening will be done in batch equilibrium tests at 3 levels of temperature (room, 50°C and 75°C) using a synthetic solution containing concentrations of As(III), Sb(III) and Fe(III) at a level comparable to that found in the leaching experiments. Column breakthrough experiments at room temperature will be done next for all four adsorbents. The best adsorbent will be chosen and tested in column experiments using real solution at room temperature. Elution experiments will examine the use of only concentrated HCl solutions. No consideration will be given to Sb recovery from the strip solution.

Schedule

It is estimated that the project will take six (6) months to complete. See the project timetable in Appendix A.

Deliverables

A final report detailing the observations and drawing any relevant conclusions will be prepared at the end of the studies. Recommendations for further work will be offered, where such recommendations arise from the studies done.

Project Leader

John Dutrizac will be the project leader, who will direct the solubility tests. Any questions regarding the technical aspects of this project should be addressed to him at (613) 995-4823. Other key personnel will be P.A. Riveros, A. Dubreuil, T.T. Chen and R. Lastra. Their curricula vitae are included in Appendix B.

MMSL PROJECT PLANNING SHEET

Project Name: Recovery and purification of arsenic oxide
 Project Leader: J.E. Dutrizac
 Client Name: Royal Oak-DIAND
 Project Number: 601903

STEPS	TIME ELAPSED (MONTHS)						Estimated
	1	2	3	4	5	6	Cost (\$)
1 Solubility measurements							26,541
2 Dust vapourization							7,895
3 Mineralogical characterization							3,917
4 Ion exchange							14,380
5 Preparation of final report							2,266
							54,998