

MEMORANDUM

**TO: John Stard
Mine Manager
Giant Mine**

Date: October 30, 1995

**FROM: Erik Madsen
Environmental Superintendent
NWT Division**

RE: UPDATE - ARSENIC STORAGE STUDY: ASSISTANCE REQUIRED

As part of our water licence, we are required to conduct an elaborate study on the arsenic storage vaults located underground. The NWT Water Board approved the Terms of Reference for this study in the fall of 1993 (see attached), which outlined a schedule as to when aspects of the study would be undertaken.

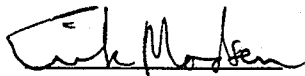
The time frames outlined by Royal Oak and approved by the Water Board have not been adhered too and hence the Water Board wrote a disturbing letter this spring/summer suggesting that we hire professional expertise to complete this study. This has been done, as Mr. Fred Matich is now heading up this study and will be responsible for hiring sub-consultants to complete site-specific areas of the study.

In order to get back on the time schedule, Fred has suggested and I agree that a submission should be presented to the Board's Technical Advisory Committee in December (week of 11th to the 14th). This submission should provide a detailed summary/facts, (including maps) that are consolidated into one relevant report of the existing system of storage chambers. This report would then form the base document for use in generating other required documents, (such as the 3D Geological Model and the Risk Assessment Analysis).

Fred is planning to come to Yellowknife sometime during the week of November 6 - 10th. He has requested that we either get our own Engineering/Geology staff to start preparing maps using CAD and for preparation of the text of the report or we contract it out to Ferguson, Simek, Clark. When Fred is in Yellowknife he can meet with the CAD operator/Engineer to review the maps etc.

Attached is a list of available information in which Fred thinks would be relevant to production of a dedicated report/maps. I have all of this information in 5 boxes in my office and plan to go through it, placing the information in the same order as Fred presents it..

In summary, this base document has become a priority report in order to be completed in time for a presentation to the Board's Technical Committee in December. In meet this deadline, assistance from the Technical Services Department and the Geology Department is essential.



Erik Madsen

c.c. P. Bengts
L. Connell
F. Matich

MAJM Corporation Ltd.


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Canada

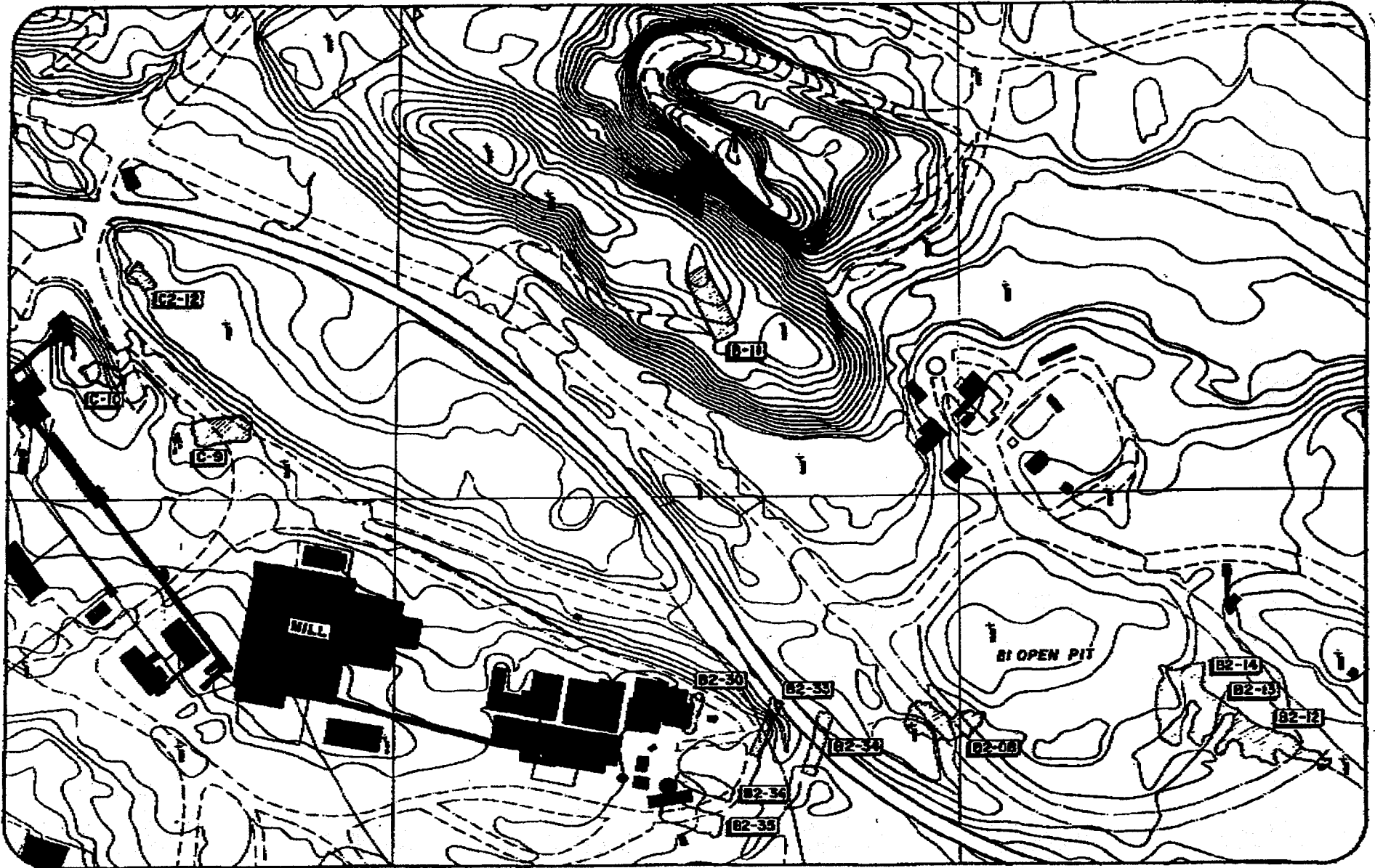
FAX TRANSMISSION COVER SHEETDATE: October 28, 1995 NO. PAGES (including cover sheet) 8TO: NAME: Mr. Eric MadsenCOMPANY: Royal Oak MinesFAX NO. 403. 669. 9424FROM: Fred MatichFAX NO. 416. 239. 0821
416. 247. 1071SUBJECT: Arsenic Storage Study

As discussed, herewith a listing of
the available data base which would
be relevant to production of a dedicated
report on the existing system of Arsenic
Storage Chambers, together with a suggested

The work involved will require
CAD capability plus engineering/geological/
mining/environmental expertise to assemble
the material into a form suitable for access
by the CAD operator, and for preparation of the

 text of the report. NOTE:
will call you again later
Geotechnology, in the week, as
arranged.

If there are any problems with
this transmission, please contact
me at 416.239.0821.



GIANT YELLOWKNIFE MINES LIMITED

SURFACE PLAN SHOWING U/G ARSENIC STOPES

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SHORT TITLE

Royal Oak MinesSIGN SUBJECT Giant Yellowknife Division; Arsenic Storage

REF. DWGS. _____

Available Data Base: I. General

Ref.

- 1 • Drawing S-94-1 Surface Plan, Arsenic Chamber Locations, April 7, 1994.
- 2 • Report by Gecon Inc. Mine Backfill Sampling Program, Dec. 11, 1981.
- I-3 • File titled "Mine Data" Arsenic Storage. Memo from M. J. Lye. April 16, 1968.
- I-4 • Memo by M. Mitchell to A. Marshall. "Arsenic Dust Density". Jan. 30, 1985.
- I-5 • Folder titled "Arsenic Bulkheads" Historic data assembled in 1995.
- I-6 • Folder titled "As₂O₃ Bulkheads" Assembled in 1995.
 - Folder titled "Arsenic Recovery, PRE-1988". Assembled in 1995.
- I-7 • Memo from W. M. Gilchrist to A. K. Muir titled "Underground Disposal of Arsenic" Nov. 22, 1960. *
- I-8 • Folder titled "Arsenic Storage, Inspection" Assembled in 1995.
- I-9 • Folder titled "Collection + Storage of Arsenic Dust" with Drawings. Assembled in 1995.
- I-10 • Folder titled "Area 1, Arsenic Recovery"
- I-11 • Folder titled "Arsenic Storage, Papers & Reports" assembled in 1995.
- I-12 • Folder titled "Arsenic Storage Inspection Reports. Assembled in 1995.
- I-13 • Folder titled "Arsenic Storage - General Location" Assembled in 1995. Has surface Plans and Generalized Cross-Sections.
- I-14 • Folder titled "Composites" Assembled in 1995. Contains drawings (plans, cross-sections, etc) and reports.
- I-15 • Folder titled "1994 Arsenic Inspections and General Info). Contains data mainly on Arsenic Chamber No. 12

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REF. DWGS. _____

Available Data Base. I. General (cont'd).

- I-16. Folder Untitled. Contains memo by J.D. Bateman to A.K. Muir "Ground Testing For Arsenic Disposal" November 18, 1950. and results of diamond core drilling and temperature measurements.*
- I-17. Folder Untitled. Contains Drawings and correspondence re temperature measurements in 1970's, and earlier.*
- I-18. Drawing. Giant Yellowknife Mines Ltd. "Underground Arsenic Storage in Relation to Open Pits".
- I-19. Drawing. Giant Mine. Surface Geology. 17 August, 1995.

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Ref. Available Data Base : II Individual Storage Chambers.

- II-1. Chamber No. 11. Underground Bulkhead Design, 1985-86.
- II-2. Chambers Nos. C2-19; C2-20; C2-21. Folder on Proposal for Underground Arsenic Disposal Chamber, Jan 3/75.
- II-3. #14 and #15 Arsenic Stopes. Folder of memos and drawings assembled in 1995.
- II-4. B 2-08. Arsenic chamber. (Assembled in folder, 1995) contains drawings.
- II-5. B2-30; B2-33; B2-34. (Assembled in folder, 1995) contains drawings and drill hole data.
- II-6. B2-35; B2-36. (Assembled in folder, 1995) contains drawings.
- II-7. B2-12; B2-13; B2-14. (Assembled in folder, 1995) contains drawings and reports.
- II-8. B2-08. (Assembled in folder, 1995) contains drawings.
- II-9. C2-12. (Assembled in folder, 1995) contains drawings and memo reports.
- II-10. Chamber No. 9. (Assembled in folder, 1995) Drawings and memoranda.
- II-11. Chamber No. 11. (Assembled in folder, 1995) Memo only.
- II-12. Chamber No. 10. (Assembled in folder, 1995) Memos and one drawing.
- II-13. Chamber No. 12. (Assembled in folder, 1995) Report on leak in October, 1990.
- II-14. Chamber No. 12. (Assembled in folder, 1995) Report on grouting of Bulkhead.
- II-15. #12 Arsenic chamber. (Assembled in folder, 1995) contains drawings, reports and correspondence.
- II-16. #11 Arsenic chamber. (Assembled in folder, 1995) contains sketches and correspondence.
- II-17. #12 Arsenic chamber. (Assembled in folder, 1995) contains drawings, correspondence and reports.
- II-18. Drawing B2-30 Arsenic Storage October 15, 1971.
- II-19. Drawing 2-14 Stope Thru Inspection Slot July 12/65.

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I-20 • Drawing	B2-30, Arsenic Storage 'B', level 250	Oct. 15/71.
I-21 • Drawing	B2-36, Arsenic Storage 'B', level 250	Oct. 19/71
I-22 • Drawing	B2-08, Arsenic Storage 'B', level 250	Nov. 10/71
I-23 • Drawing	B2-35, Arsenic Storage 'B', level 250	Oct. 19/71
I-24 • Drawing	B2-34, Arsenic Storage 'B', level 250	Oct. 18/71
I-25 • Drawing	B2-33, Arsenic Storage 'B', level 250	Oct. 15/71
I-26 • Drawing	Section No. 6 2-12 Stope 'B' level 100-250	July 12/65
I-27 • Drawing	Shaft B, Surface, DDH for No. 11 Arsenic Stope	December 31, 1986.
I-28 • Drawing	MA-340, #11 Arsenic Stope, August 20/1986.	
I-29 • Drawing	MA-243, #10 Arsenic Chamber, July 7/1984.	
I-30 • Drawing	(Un-numbered) C-12 Arsenic Storage	
I-31 • Drawing	B2-12/13/14 Arsenic Storage	Aug. 15/1968.
I-32 • Drawing	As Chambers #12 #14 & #15, March 4, 1994.	
I-33 • Drawing	No. 12 Arsenic Stope. Lower & Upper Bulkhead, General Arrangement.	March 22, 1988.
I-34 • Two large untitled Drawings	showing plan and section details of Arsenic Storage chambers 11 & 12.	
I-35 • Drawing	Plan of Arsenic stopes B2-12, B2-13 and B2-14	May 8, 1991. Updated Sept, 1988.
I-36 • Drawing	Plan of Arsenic stopes 2-08/2-30/2-33/2-34/2-35/2-36.	May 7/81. Updated Aug 22/88.
I-37 • Drawing	Composite Plan of Arsenic Stopes C2-12 / #9 / #10.	
I-38 • Drawing	C & B. Composite Arsenic Storage in waste	July 4, 1974.
I-39 • Drawing	Shaft C, Arsenic Storage C#9 (In Waste)	Feb. 1/1975

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Outline of Dedicated Factual Report

covering:

- Items 5 and 6 of "Information to be collected"
- Items 2 and 3 of "Sources of Information"
- (Notes by Mr. L. Connell, May 19-20, 1995).

Intent is to consolidate into one report all of the relevant factual information on the existing system of Storage Chambers.

1.0 INTRODUCTION

- Objectives of this report
- Applicable Regulatory controls and requirements.

2.0 BACKGROUND

- Historical; schedule of implementation, mining activities.
- Basic approach to design, construction, operation, etc.
- Arsenic properties
- Interface with mining operations
- Regulatory Approvals, Inspections, Reporting, etc.
- Published technical / Environmental literature.

3.0 STORAGE CHAMBERS (For each individually)

- Site investigation/s.
- Regulatory Approval
- Design of chamber, bulkheads, etc.
- Construction
- Operational Factors, filling schedule, etc.
- Inspections; Contingency plans
- Performance (Problems, if any).

4.0 POST-CONSTRUCTION STUDIES

- Geotechnical / Geological
- Inspections
- Thermal / Permafrost
- Piezometric
- Interface with mining

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Outline of Dedicated Report (cont'd)

5.0 GENERAL

- Summary of main features
- Outline how data would be utilized in additional reports to meet Regulatory requirements.
- Presently proposed strategy for decommissioning
- Mining activities in near future.

APPENDICES

(To suit sections 2.0, 3.0 and 4.0 of Report)

DRAWINGS

- overall plan (Perhaps base on Drawing S-94-1 of April 7, 1994)
- Individual Plan Drawings for Four groups of chambers, ie(1) B2-12, B2-13, B2-14
(2) B2-08, B2-30, B2-33, B2-34, B2-35, B2-36.
(3) C2-12, #9, #10
(4) #11, #12, #14, #15
- For each Chamber, Drawings showing
 - Plan, vertical and horizontal sections
 - Details of access drifts; bulkheads, etc.
 - Investigatory works, eg. drill holes, thermisters, etc.
 - Remedial work, where involved.

NOTE: The intent is that this report would be the base document for use in generating other required information (eg. 3D Geological model) and other reports.