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to: Dave Anthony - Manager of Environmental Services
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re: Minutes of Conference Call with Renewable Resources
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From the desk of...

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Conference Call: NWT Renewable Resources
Environmental Protection Division
June 21, 1995 - 10:00AM

Present: Jim Sparling - NWT Renewable Resources
Emery Paquin - NWT Renewable Resources
Dave Anthony - Royal Oak
Larry Connell - Royal Oak

Subject: Stack Dispersion Modelling & Continuous Emission Monitoring of
the Giant Roaster Stack

1) Continuous Emission Monitoring:

N.W.T. Renewable Resources has requested that Royal Oak Mines Inc. install continuous emission monitoring instrumentation on the Giant roaster stack. This equipment can be used to monitor both sulphur dioxide and arsenic trioxide emissions utilizing an opacity and sulphur dioxide monitor. The cost of installing this instrumentation is in the order of \$100,000. NWT Renewable Resources will provide Royal Oak with a list of engineering firms who can select and install the appropriate equipment.

Renewable Resources asked us to consider the fact that a single stack sampling test utilizing a contractor will cost Royal Oak approximately \$20,000 and provide only one data point, whereas the investment of \$100,000 will provide continuous emission monitoring. In the early 1980's the management of the Giant mine committed to carrying out annual sampling of roaster stack emissions to track the performance of the gas cleaning equipment. Royal Oak personnel are currently investigating the cost of having Entech Ltd. of Calgary conduct a stack sampling test later this summer.

We agreed to obtain a detailed cost proposal from several of these engineering firms covering the installation and setup of a continuous emission monitoring system for the Giant roaster stack. No commitment on installation was made at this time.

2) Dispersion Modelling

The Dispersion Modelling indicates that the desired ground level concentrations cannot be achieved by simply changing stack height or gas exit temperature. The study indicates that a 30% reduction can be achieved by doubling stack height. A similar reduction can be achieved by raising gas temperature. The variable with the largest influence is the gas exit velocity.

The study makes recommendation for further modelling which would look at what geographic reduction in ground concentrations of sulphur dioxide can be achieved by changing a number of these stack variables in combination. In other words can the ground concentrations of sulphur dioxide be reduced within the Yellowknife area.

NWT Renewable Resource has expressed their interest in proceeding with a second dispersion modelling study to persue these recommendations. The study would be jointly funded with Royal Oak Mines Inc.

NWT Renewable has recommended that Royal Oak have an engineering firm conduct a separate study to determine what changes in the stack and gas cleaning plant are technically achievable given the limitations on economic resources. This study would focus on stack height, stack diameter, heating of the baghouse exit gas and sizing of the stack fan. The study would be used to identify realistic limitations on the following dispersion model variables:

- Stack height and diameter (Assume a taller but smaller diameter steel stack)
- Gas exit temperature (Given current burner and heat transfer technology, how much heat can we put back into the exit gas).
- Gas exit velocity (How much can exit velocity be realistically increased by reduction of the stack diameter and by increasing the capacity of the stack fan).

We expressed an interest in principle in entering into these additional studies with NWT Renewable Resources, dependent upon the preparation of more detailed terms of reference and firm estimates of the cost involved.

(Order of magnitude:	Engineering Study	\$20,000)
(Cost Estimate:	Dispersion Modelkling	\$15,000)
(Split: RYO: \$37,500	NWT Renewable Resources:	\$7,500)

It was agreed to utilize the next month to prepare terms of reference for these studies, to choose an appropriate engineering firm and to obtain price quotations. The selected engineering firm needs to interface with the dispersion modelling group (HUM Engineering) to ensure that the data being used is realistic and technically achievable with reasonable cost. It was agreed to review this issue at the end of July and come to an agreement on an award of a second phase study.

Jim Sparling indicated that the CBC Focus North program on stack emissions from the Giant mine aired in Yellowknife on Monday, June 19th. The CBC National Midday Program have expressed their interest in airing a portion of this program during an upcoming edition.