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Mr. Ed Collins, P.Eng.
Chief, Environmental Engineering
Environmental Protection Branch
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Dear Mr. Collins:

Re: Comments on the Draft Copy of the Report Entitled "Socio-economic Analysis of Proposed Control Options For Royal Oak's Giant Gold Mine"

The following are my comments and concerns with the content of the draft report dated June 21, 1996 prepared by Resource Futures International, entitled "Socio-economic Analysis of Proposed Control Options for Royal Oak's Giant Gold Mine.":

Item #1 - Concept of a Community Covenant

The author of the report suggests the use of a "Community Covenant" as one option for dealing with the control of arsenic emissions from the Giant mine gold roaster stack. As we discussed in Yellowknife the concept of a "community covenant" is not one that we understand very well nor have any experience with. Before taking a position on such an approach, Royal Oak would like to know a lot more about how such a covenant would be structured, how it would work and how it has worked elsewhere. I would expect that you would receive a similar response from many of the other stakeholders in the community. Perhaps the author of the report could expand this section to provide more information on how such a "community covenant" could be structured and how they see it operating. The inclusion of several similar case histories would be useful.

My impression is that it would be very difficult to successfully structure such a community covenant in this instance given the distrust that exists between stakeholder groups in Yellowknife and given the diverse interests of these groups on a wide number of issues. The report's author indirectly makes reference to some of the areas of distrust that exists between community groups and the mine. This lack of trust is deep rooted and covers a lot of past history. This mindset would make it difficult to succeed at reaching a mutually agreeable solution on this particular issue. It would require the

assistance of a professional mediator and even then may not succeed. The concept is interesting and I would not want to leave you with the impression that Royal Oak dismisses it as a viable option. Additional information and discussion is required before we can take a position.

Item #2 - Existing Human Health Effects

In section 2.1.3.1 and 2.1.3.2 the author estimates an increased risk of cancer from ongoing exposure to the ambient concentrations of arsenic in the Yellowknife area as follows:

For inhalation: 0.14 to 0.86 additional deaths over a 70 year exposure period

For Ingestion: an increase in the occurrences of skin cancer of 0.26 to 0.27 over a 70 year exposure

These numbers are overstated when dealing with the issue being dealt with in this socio-economic report. The issue is what will be the health benefits derived from instituting new emission controls on the future release of arsenic from the Giant roaster. The mine has an economic mineable ore reserve of only 8.5 years. If the status quo were maintained the exposure risk would not extend over a 70 year period. Even if by some miracle of economics, all of the mineralized material at the Giant Mine could be made economic the mine would be out of ore in 23 years. It is very unlikely that this could occur. No one including those in the NWT and Federal governments who have studied the reserve picture at the Giant mine expects that the Giant mine can continue to operate economically beyond the next ten year period without some major new find of ore reserves. Consequently the report overstates the potential health risk that could be derived from imposing emission regulations in the final 8.5 to 10 years of the mine's life.

The report makes no direct reference to the health studies undertaken by the Federal government in the mid to late 1970's which specifically focussed on the issue of what impact the ambient levels of arsenic in Yellowknife were having on the general population. My memory is that the findings indicated that the only evidence of increased risk to the population of Yellowknife from arsenic was among a small number of mine employees who were working in areas of the plant that had a higher risk of exposure to arsenic. As a result ongoing health effects monitoring programs were initiated for these people.

Item #3 - Technological Options to Reduce Arsenic Emissions

Section 2.2.1 references the Hatch study on the technical options to reduce arsenic emissions from the Giant roaster stack. The Hatch report offers three options for reducing arsenic emissions:

- 1) The Use of a Wet Scrubber,
- 2) The use of a Wet Electrostatic Precipitator
- 3) The use of Activated Carbon to Adsorb Arsenic from the gas Stream

The report however does not tell the reader what is to be done with the arsenic that is removed from the gas stream in each of these processes. The arsenic that is to be removed in each of these process options has to be dealt with in some environmentally acceptable fashion. The first two options will produce a water based slurry high in arsenic while the third option will produce a water-carbon slurry high in arsenic that must be treated or stabilized before being disposed of. The cost of treating this by-product must be included in the socio-economic analysis for the findings to be valid.

The socio-economic report leaves the reader with the impression that each of these technical options for reducing the emissions of arsenic from the Giant roaster stack are viable, well proven and demonstrated technologies. In fact I do not know of a comparable case study where any of these techniques are being used specifically to reduce arsenic emissions. If this is the case, then there is a risk that these technical options will not achieve the expected reductions.

It would be useful to include any available case histories where these technologies are being applied to reduce arsenic emissions from a gas stream to validate the claim that a 0.1 mg/m³ arsenic emission level can in fact be consistently achieved with such equipment.

If there are no case histories then it should be so stated in the report so that the decision makers and the other stakeholders are aware that this is unproven technology and that there is a risk that it will not perform as well as expected. It would be useful if these risk could be discussed in some detail.

Item #4 - Economic Analysis

Section 3.2.2.2 deals with the economic viability of the Giant Mine. On page 45, Table 8 indicates that the mine generated a net cash flow of \$8.2 million in 1995, \$13.3 million in 1994, \$4.6 million in 1993, \$6.0 million in 1992 and \$8.4 million in 1991. These figures are not correct and mislead both the decision makers and other stakeholder.

In 1995 the Giant mine produced 91,423 ounces of gold. The average spot price for gold in 1995 was \$384 US per ounce consequently the mine earned revenues of \$35,106,432 US. In 1995 operating costs at the Giant mine were \$339 US per ounce of gold produced (cash cost of \$329 + depreciation and amortization cost of \$10) meaning that the mine spent \$30,992,397 US on daily operations. In addition \$1.7 million US was invested in 1995 as capital in the purchase of replacement equipment and on the development of the Supercrest ore reserves. Consequently the net cash flow from the Giant mine in 1995 was \$2,414,035 US or a margin of profit of \$26.41 US per ounce of

gold produced. This is significantly less than the \$8.2 million quoted in the report even after allowing for conversion from US to CDN dollars. The data that I used to calculate the cash flow attained at Giant was all taken from the 1995 Royal Oak annual report and is consequently in the public domain.

The annual report refers to a "realized" gold price of \$409 US in 1995. This realized gold price includes earning made by the company on its gold hedging program. These hedge gains are earned by prudent trading on the gold futures market at the corporate office and have no bearing on the economic performance of the Giant Mine. Any economic analysis should be based on the recognized spot gold price.

In 1994 the Giant mine produced 101,176 ounces of gold at a cost of \$300 US per ounce (cash cost of \$289 US + depreciation and amortization of \$11US). The average spot gold price in 1994 was \$384US per ounce consequently the mine had a revenue of \$38,851,584. The mines operating costs for 1994 were \$30,352,800 US. In addition \$3,264,129 US was invested in 1994 as capital in the purchase of replacement equipment and in development of new ore reserves. Consequently the net cash flow from the Giant mine in 1994 was \$5,234,200US or a margin of profit of \$51.73US per ounce of gold produced. Again this is significantly less than the \$13.3 million quoted in the report even after allowing for the conversion of US to CDN dollars.

We hope that these comments prove helpful in the completion of the Environment Canada socio-economic analysis. We would be welcome to discuss these issues further with you at your convenience.

Sincerely,
Royal Oak Mines Inc.



Larry Connell
Manager of Environmental Services

cc: John Stard
Sadek El-Alfy
Brian Penney
Emery Paquin - NWT Renewable Resources