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ACID PRODUCTION POTENTIAL OF SAMPLES FROM THE VANGORDA PROPERTY

Project 2-1576
Vangorda Report No.2

Prepared for:

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SUMMARY

A sample of ore from the first bulk sample obtained from the Vangorda property was examined for its acid production potential. This sample is a potential source of acidic drainage water.

INTRODUCTION

OBJECTIVE

To assess the potential for the formation of acidic drainage water due to microbiological oxidation of sulfide minerals.

BACKGROUND

Kerr-Addison Mines Ltd. is evaluating the feasibility of mining the Grum lead-zinc deposit on the Vangorda property near Faro in the Yukon Territory. The results presented in Vangorda Report No.1 indicated that a sample of barren rock from the property was not a potential excess acid producer, whereas a sample of medium-grade ore did have the potential although the amount of acid produced in the laboratory tests appeared to be quite small.

An additional sample of ore grade material has been submitted for testing and the results are presented in this report.

MATERIALS AND METHODS

SAMPLE

An approximately 3 kg sample labelled "ore material from the first bulk sample", was submitted by Mr. John Carrington of Kerr-Addison Mines on October 27, 1975. The sample was crushed and pulverised for the initial chemical test and a sub-sample was split out, wet ball-milled to pass a 400 mesh sieve and used for the confirmation test. Ten g portions were used for both tests as outlined in Appendix 1 of Vangorda Report No.1.

STAFF

This investigation was carried out by the Mineral Microbiology Group of the Division of Applied Biology. Miss H. Kurtz was responsible for

acid production test, assisted by Mr. L. Gutiérrez. Miss M. Lewis was responsible for the sulfur and zinc analysis. Dr. D.W. Duncan was responsible for the interpretation of the experimental results and preparation of the report.

RESULTS

INITIAL TEST (CHEMICAL)

The ore sample assayed 33.5% sulfur and 6.6% zinc. The sulfur content was equivalent to 2010 lb of sulfuric acid per ton. The sample had a natural pH of 8.4 when 10 g was suspended in distilled water and it required 321 lb of sulfuric acid per ton to stabilize the pH at 3.5, the upper limit for microbiological leaching. The sample has the potential of producing acidic drainage water.

CONFIRMATION TEST (BIOLOGICAL)

The 10 g sample was adjusted to pH 2.7 by adding 323 lb of sulfuric acid per ton over 3 days. After 6 days of leaching the pH was down to 1.6. The addition of half the original weight of feed (5 g) raised the pH to 3.8 but within 24 hrs it had dropped back to 2.5. The addition of a second 5 g portion raised the pH to 4.1 but within 20 hrs the pH was at 2.8 and within 48 hrs it had dropped to 2.5, indicating the bacteria had the ability to produce sufficient sulfuric acid to satisfy the samples acid demand.

The zinc content of the leach solution was also monitored during this leach. The dissolved zinc concentration increased from 1.87 g/l at the time the sample was inoculated to 5.24 g/l after 2 days, 6.92 g/l after 3 days and a maximum of 7.72 g/l after 6 days which was the time the pH reached 1.6. This represented approximately an 88% extraction of the contained zinc.

DISCUSSIONS AND CONCLUSIONS

The results indicate that the sample of ore grade material representing the first bulk sample from the Grum deposit is capable of causing acidic drainage water through microbiological oxidation of the sulfides it contains. The sample was a stronger acid producer than the medium grade sample examined previously and had leaching characteristics closer to those observed for ore grade samples taken from the property of Cyprus Anvil Limited located in the same area.

Approximately 88% of the zinc contained in the sample was released during this test at a rapid rate indicating that the acid production was associated with oxidation of the zinc sulfides as well as the pyrite contained in the sample. Thus any development or waste rock containing mineralization represented by this sample should be stockpiled in such a manner that any drainage water arising from the stockpile could be treated if necessary. The potential for acidic drainage arising from mineralization on the Vangorda property is moderated by the climatic conditions of the area. However, the possibility exists that extremely large stockpiles will be self insulating against environmental forces and should oxidation of sulfides begin the heat released by the exothermic oxidation reaction may be sufficient to maintain a satisfactory environment for microbiological action within the stockpiles.



D. W. Duncan
Program Leader, Mineral Microbiology.

Approved on behalf of B.C. Research



C. C. Walden
Head, Division of Applied Biology.



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9 January 1976

Mr. M.D. Rowswell
Executive Vice President
Kerr Addison Mines Limited
P.O. Box 91
Commerce Court West
Toronto, Ontario
M5L 1C7

Dear Mr. Rowswell,

Re: Kerr AEX Grum Joint Venture

We are enclosing a copy of the acid generation test conducted on the Grum deposit ore. The test indicates that the ore is a potential acid producer which confirms our previous thinking with respect to closely watching the quality of the mine drainage.

Yours very truly,

Alan V. Bell, P.Eng.
Assistant Manager
Resources & Environmental Division

AVB/pb
c.c. J. Barter
J. Carrington ✓

Encl.