

**LABORATORY EVALUATION OF THE
INCO SO₂/AIR CYANIDE REMOVAL PROCESS
FOR THE MOUNT NANSEN GOLD PROJECT**

Prepared for:

BYG Natural Resources Inc.
#208-3190 St. John's Street
Port Moody, B.C.
V3H 2C7

Prepared by:

Process Research Associates Ltd.
9145 Shaughnessy Street
Vancouver, B.C.
V6P 6R9



Bernhard Klein, Ph.D.
Senior Process Metallurgist

September 9, 1994

1 SUMMARY

Process Research Associates Ltd received 178 samples of pulverized drill core from the Mount Nansen property in the Yukon Territory which were combined to create a composite weighing 33 kg. A 20 kg split of the sample was subjected to CIP cyanide leaching and the barren pulp was treated using the Inco SO₂/air cyanide removal process.

The gold and silver grades of the material were determined to be 6.34 g/t and 65.1 g/t, respectively. Cyanide leaching extracted 80.8% of the gold and 38.2% of the silver.

The main process variables for the SO₂/air treatment process are the SO₂/CN_T ratio (SO₂ was added as an aqueous Na₂S₂O₅ solution), the copper dosage, the dissolved oxygen level, the pH and the reactor retention time. Based on the level of dissolved copper in the barren solution (83 mg/L), no copper addition was required for the process. The pH controller was set at 8.5, however even after 9 hours of continuous operation, the pH did not drop below the set point and therefore no lime addition was required.

An SO₂/CN_T ratio of 4.2/1 with a reactor retention time of 60 minutes reduced picric acid cyanide (CN_p) levels from 109 mg/L to as low as 0.06 mg/L and CN_T levels from 98.5 mg/L to 0.09 mg/L. At a lower ratio of 3.7/1 the best CN_p achieved was 1.6 mg/L. Decreasing the retention time to 30 minutes resulted in a CN_p level of only 8.0 mg/L. Further testing is required to optimize the SO₂ dosage.

Aging the treated effluent for 7 days reduced the CN_T level to 0.005 mg/L.

SO₂/air treatment reduced the copper concentration from 83 mg/L to 0.8 mg/L. Aging for seven days reduced the copper level to the 0.2 to 0.3 mg/L range. The SO₂/air treatment caused arsenic to dissolve increasing the concentration from 1.95 mg/L to 4.85 mg/L. Aging for up to 14 days did not reduce As levels which increased slightly during this period to 5.6 mg/L.

An acid base accounting test performed on the treated effluent residue revealed that the material contained 0.59 % sulphide sulphur and the net neutralization potential (NNP) was -5.61. Despite the negative NNP, it is not expected that acid rock drainage would be a problem since the sulphide sulphur content is very low.

2 INTRODUCTION

BYG Natural Resources Inc. commissioned Process Research Associates Ltd to conduct testing for the detoxification of cyanidation effluent for the Mount Nansen Gold project. The testwork was performed on an ore sample which was cyanide leached (CIP) to produce the barren cyanidation effluent sample for testing. This report describes the procedures and summarizes the results of the test program.

The SO₂/air cyanide removal process is patented by Inco and is used commercially at numerous locations under license.

3 EXPERIMENTAL PROCEDURES

A composite sample of Mount Nansen ore was leached with cyanide and the barren solution was used in subsequent cyanide removal testwork. The following describes testing procedures that were used.

3.1 Sample Preparation

A total of 178 pulverized diamond drill hole samples weighing between 50 g and 350 g each were combined to produce a composite. The sample numbers, reported gold grades and weights are presented in Appendix I. Approximately 20 kg was riffled from the 33 kg composite sample for cyanide leaching. A representative split was obtained and assayed for gold, silver and ICP metals.

3.2 Cyanidation leaching

The 20 kg composite sample was subjected to carbon in pulp (CIP) cyanide leaching to produce barren slurry for SO₂/air detoxification testwork. The cyanide leach conditions established by Melis¹ were used and are as follows:

Grind (% -200 mesh)	70.0
pH	10.5 - 11.0
Solids content (%)	50.0
Cyanide concentration, g NaCN/L	0.3
Leach retention time, hours	24
Carbon adsorption retention time, hours	5
Carbon pulp loading, g/L	20

A sieve analysis of the composite sample revealed that 80.9% of the material was finer than 200 mesh which is finer than the target grind of 70% -200 mesh. As a result, the sample was not ground prior to cyanide leaching. Cyanide leaching was performed in a 100 L overhead stirred tank reactor.

The pH was adjusted to 10.5 by adding lime. Cyanide was added at 0.3 g NaCN/L. The pH and NaCN concentration were monitored and controlled to maintain the target levels. Following 24 hours of leaching, 20 g/L of activated carbon was added to the reactor to absorb the gold. Extraction with carbon was continued for 5 hours.

The carbon, leach residue and barren leach solution were assayed for gold and silver. The solution was also analyzed for copper, iron, nickel, zinc, total cyanide, thiocyanate, weak acid dissociable cyanide, picric cyanide, ammonia, nitrate, nitrite, sulphate, sulphide and ICP metals. The remaining pulp was used for SO₂/air detoxification testing.

Foot Note: 1. Report Melis Engineering Ltd., January 1992, "Mount Nansen Gold Project Mill and Surface Facilities Feasibility Study".