MONDAY, AUGUST 22, 2005, P.M.

SESSION 4: INTERNATIONAL SYMPOSIUM ON THE TREATMENT OF GOLD ORES

ORE CHARACTERIZATION AND RECOVERY OF GOLD BY GRAVITY
Sponsor(s): Hydrometallurgy Section, The Metallurgical Society of CIM, Canadian Mineral Processors Division of CIM, CANMET-MMSL
Room: Imperial Ballroom 3
Chair(s): J. ABOLS, Canadian Operations, Gekko Systems, Canada and
A.R. LAPLANTE, McGill University, Canada

14:00 — OPENING REMARKS
G. DESCHÊNES, CANMET, Canada

PAPER 4.1—14:05 (KEY NOTE)
RECOVERY CREEP IN MINE DEVELOPMENT PROGRAMMES AND BARRICK'S RESPONSE WITH ASSOCIATED MITIGATING MEASURES.
P. KINVER, Barrick Gold Corporation, Canada
Abstract not available.

PAPER 4.2—14:45
RECOVERY OF FINE GOLD PARTICLES USING A FALCON 'B' SEPARATOR.
B. GEE, P. HOLTHAM, Julius Kruttschnitt Mineral Research Centre, Australia
R. DUNNE and S. GREGORY Newmont Australia Ltd., Australia

Many gold treatment plants have sulphides and coarse particle gangue components that contain gold in their tailings (cyanide leach residues and flotation tailings). Coarse and very fine liberated gold may also be present in some tailings streams. Two issues usually govern the economics of recovering additional gold from gold occluded in sulphide and gangue particles. The liberation characteristics of the gold in the sulphide and coarse gangue (gold liberation versus grind size) is the first and most important of the two. If fine grinding can liberate a reasonable amount of the gold, then the next important issue is how effectively these two constituents can be concentrated. Flotation will achieve high sulphide recovery but is usually costly. Selectivity is also an issue because of entrainment. Continuous centrifugal gravity concentration offers a viable solution to the recovery of both sulphides and coarse gangue however selectivity is also likely to be a problem. The possibility of improving concentrate grade by using a Falcon B separator was investigated. This paper describes a program of test work carried out on a gold leach tailings using a laboratory Falcon 'B' separator. The program involved three different bowl angles: 10, 12 and 14 degrees and two bowl speeds (giving 250 and 350G accelerations). A number of tests were also performed on samples that had free gold present to ascertain the size-by-size recovery of gold in these samples.

COFFEE BREAK—15:10-15:25

PAPER 4.3—15:25
GOLD CHARACTERIZATION OF A SAMPLE FROM MALARTIC EAST (QUÉBEC) USING CONCENTRATION BY HYDROSEPARATOR.
R. LASTRA, J. PRICE, Natural Resources Canada, Canada
L.J. CABRI, Cabri Consulting Inc., Canada
N.S. RUDASHEVSKY, V.N. RUDASHEVSKY, Center for New Technologies, and
G. MCMAHON, Harvard Medical School & Brigham and Women's Hospital, U.S.A.

A gold sample assaying 11.4 g Au/t was selected for this study. Approximately 99% of the gold in this sample occurs as discrete gold minerals; the balance occurring as invisible gold in pyrite (determined by SIMS analysis). The sample was coarsely ground and sieved, yielding ~38, 17, 22 and 22 wt.% in the -400+160 µm, -160+80 µm, -80+40 µm and -40 µm size fractions. Assays of the size fractions gave a gold distribution of ~32, 20, 21, and 27% respectively. Processing with the hydroseparator (model HS-02) gave two tailings products and one concentrate from each size fraction. Assays of the concentrate from each size fraction gave gold recoveries of ~7, 7, 24, 19%, respectively. Polished sections were prepared from each hydroseparation product and studied by image analysis to automatically search for gold minerals. Calculations were done using the surface area of the grains of gold minerals found on the polished sections.

PAPER 4.4—15:50

MAXIMIZING GRAVITY RECOVERY THROUGH THE APPLICATION OF MULTIPLE GRAVITY DEVICES.

J. ABOLS and P.M. GRADY, Canadian Operations, Gekko Systems, Canada

Recovery via gravity is one of the oldest mineral processing methods available. Unfortunately, the use of gravity techniques for gold recovery has been in decline for the past century as more effective chemical processes such as flotation and leach/CIP have been developed. Recently, with the push towards more sustainable environmental outcomes, the benefits of gravity separation have become more apparent. While gravity as a unit process is not usually capable of achieving as high a recovery as flotation or whole ore cyanidation, a combination of gravity devices alone or in conjunction with these processes can offer significant advantages to the operator.

This paper reviews the range of gravity devices available, their application and the results that can be achieved by maximizing gravity through the use of a combination of gravity recovery devices. Case studies are provided.

PAPER 4.5—16:15

GRAVITY RECOVERY OF GOLD – AN OVERVIEW OF RECENT DEVELOPMENTS.

A.R. LAPLANTE, McGill University, Canada and
W. STAUNTON, Murdoch University, Australia

Gold recovery early in the flowsheet, typically from the primary grinding circuit, has seen significant advances in the past three years. Some of the advances achieved under the auspices of the AMIRA P420B Gold Processing Technology are reviewed. The areas covered are gravity-recoverable gold (GRG) characterization, GRG behaviour in classification, gravity and flash flotation simulation and circuit optimization. Examples of improvements and their impact on overall recovery are presented. Also discussed is how circuit design can benefit from these advances and where future research avenues lie.

PAPER 4.6—16:40

CONTINUOUS GRAVITY IMPROVEMENTS AT THE PORCUPINE JOINT VENTURE DOME MINE'S GRAVITY CIRCUIT.

J.A. FOLINSBEE, T.Y CHONG, PJV, Canada and
M. FULLAM. The Knelson Group, Canada

PJV Dome Mine has used some form of gravity concentration since start of milling operation in 1909 to recover free milling gold. Amalgamation and conventional jigs were first used and were replaced with the Knelson Concentrators in 1993. The Knelson concentrates produced were upgraded on a conventional shaking table prior to smelting and refining into gold bullion. In May 2002, a comprehensive review of the latest gravity recovery technology led to a piloting campaign aimed at further improving gravity recovery. The Knelson concentrates, subjected to intensive cyanide leaching in an Acacia pilot plant, were found to be amenable to intensive cyanide leaching with over 98% of the gold being dissolved within 24 hours. An Acacia Intensive Leach Reactor was successfully installed and commissioned in December 2002, to replace the shaking table. his paper describes pilot scale testing, installation, commissioning and optimization of the Acacia Intensive Leach Reactor. Also, the economic impacts on down stream processes are highlighted.