als is essential to preserve the integrity of natural gemstones in the marketplace. Some emeralds and sapphires are treated to improve their appearance. Details of the treatment processes are not always known. The most common treatment of emeralds involves filling surface-reaching fractures with colourless or coloured oils to improve the apparent clarity. Sapphires are heated, coloured near their surface, and occasionally irradiated to improve their colour. Open cavities in sapphires (more often in rubies) are filled with glass to add weight. Synthetic emeralds and sapphires are being browned by various flux and hydrothermal methods. In many cases, these treated and synthetic gem materials can be identified by standard gem testing procedures (mainly using the microscope); and non-destructive chemical analysis and visible and infrared absorption spectra. Organizations involved with the mining of emerald and sapphire should recognize the challenge jewelers face in identifying some gem materials. Loss of consumer confidence in what is sold at the jewelry counter could have a negative impact on gem mining.

PAPER TAM1-F3 — 9:30
THE DEVELOPMENT OF A MARKETING PLAN FOR MINING COMPANIES INTERESTED IN PRODUCING GEMSTONE MATERIALS FOR A LUXURY MARKET.
E.C. BRAUNWART, Columbia Gem House

How do industrial mining companies who are looking to venture into gemstone mining, approach this very different market? As more major mining concerns look at gemstones production, this question comes up more and more. Most of these companies are schooled in producing raw industrial materials. Gemstones are definitely a luxury, discretionary product driven as much by fashion as by price and supply. Just because one has a supply does not mean there is a market. This means producers must work very closely with gem and jewelry industry professionals to assess the trends and demands placed on the product from the retail and wholesale buyers. An assessment must be made as to the viability of the product and mining project, and a marketing and promotion plan is set early on. These plans generally will include strategic alliances with jewelry industry concerns for development of a value-added product. This initial assessment, market development, strategic alliances, and a sales plan will be reviewed in this paper.

TUESDAY

GEOLOGICAL SOCIETY SESSION

SESSION TAM1-G — 8:30 - 10:00
New Developments in Cordilleran Exploration
Salon: Meeting Room 19 & 20

Session Chairman: D. WILTON, Memorial University of Newfoundland

PAPER TAM1-G1 — 8:30
GEOLOGY OF THE BOTIJA AND PETAQUILLA DEPOSITS: WORLD-CLASS CU-MO-AU PORPHYRY MINERALIZATION IN CENTRAL PANAMA.
M. SMITH, Teck Corporation, Kamloops, British Columbia,
F. SPEIDEL, Innet Mining Company, Panama, and
G. McARTHUR, Adrian Resources Ltd., Vancouver, British Columbia

Cu-Mo-Au porphyry mineralization was discovered in the Petaquilla River region of central Panama during a regional survey by a United Nations Development Program team in 1968. The region is underlain by a Late Cretaceous to Recent volcanic arc, constructed on a basement of oceanic crust and marine sedimentary and volcanic rocks. Subsequent exploration outlined Botija and Petaquilla, world-class Cu-Mo-Au porphyry deposits developed around granodioritic stocks within and peripheral to the 400 km², Oligocene, calc-alkaline Petaquilla Batholith. Mineralization is hosted in equigranular to porphyritic granodiorite, feldspar+hornblende±quartz porphyry and andesitic wall rocks. Both deposits trend WNW-ESE and dip to the north, parallel to the contacts of the stocks. Prograde alteration consists of overlapping zones of potassic, phyllic, "silica-chlorite" and propylitic alteration. Sulphide mineralization consists mainly of disseminated, fracture, veinlet and quartz stockwork-hosted chalcopyrite and pyrite, with trace molybdenite and bornite. Geological resources for Botija are estimated at 534 Mt at 0.54% Cu, 104 ppm Mo and 0.104 g/t Au at a cutoff grade of 0.3% copper, and 397 Mt at 0.47% Cu, 86 ppm Mo and 0.078 g/t Au for Petaquilla. Several additional Cu-Mo-Au prospects and deposits have been identified, as well as significant epithermal mineralization in a more distal setting to the batholith.

PAPER TAM1-G2 — 9:00
PRECIOUS METAL DISTRICT AT CAMPO MORADO (MEXICO).
M. REBAGLIATI and J. OLIVER

(Abstract not available at press time.)

PAPER TAM1-G3 — 9:30
THE GEOLOGY OF THE IDAHO-MCMASTER ZONES, LADNER CREEK PROJECT.
J.T. SHEARER, M.P. DICKSON and J.S. KERMEEN, Athabasca Gold Resources Ltd.

Since 1995, Athabasca Gold Resources Ltd. has spent in excess of three million dollars on an aggressive underground and surface exploration program at the Idaho and McMaster gold deposits. The database is now over 50 000 m of diamond drilling and over 10 km of underground workings. Substantial new reserves have been defined which bring the underground total to 1.86 Mt averaging 4.42 g/t gold. Pitable reserves at McMaster total 186 000 t at a grade of 1.88 g.

The McMaster deposit is open along strike and down dip. The Idaho deposit is open down plunge to the north. The Idaho gold deposit was in production from 1981 to 1984 and was forced to close due to a variety of managerial and milling problems. Currently, there is a 1500 tpd mill and permitted tailings pond on the property. Recent metallurgical testing has confirmed that gold can be economically recovered from existing tailings and new ore into a flotation concentrate which will be shipped to an off-site smelter. Resumption of production is anticipated in the near term.

Gold mineralization is hosted by quartz-albite altered greywacke and siltstone of the basal portion of the Lower Jurassic Ladner Group within an imbricated fault zone related to the East Hozameen Fault. Reserves have also been defined in altered andesitic volcanic of the Spider Peak Formation in the Idaho area. Most of the gold showings along the belt are spatially related to the east contact of the ultramafic Serpentinite Complex.

The mineralized zones consist of stockwork veins, sheeted vein zones and cymoidally distorted, *en echelon* vein sets, and pervasively disseminated sulfide-rich albite-quartz systems. Ore grade widths of up to 30 m have been defined in the Idaho No. 1 zone.

Future exploration will concentrate on the 1.5 km long area between the Idaho and McMaster deposits. The extensions of the McMaster deposit to the north and east, the Pipestem mine area and the unexplored area around Spider Peak. Regionally, the Coquihalla Gold Belt shows many similarities in its setting to the Bridge River Camp of British Columbia and the Motherlode District of California.

METAL MINING DIVISION SESSION

SESSION TAM2-A — 10:30 - 12:00
Underground — Mining Design
Salon: Meeting Room 11

Session Chairman: HOWARD L. STOUGHTON, Central Canada Potash Inc.

PAPER TAM2-A1 — 10:30
THE COST ADVANTAGES OF USING PASTE AS A BACKFILL.
A. HENDERSON, P. NEWMAN and D. LANDRIAULT, Golder Associates Ltd., Sudbury, Ontario

The type of backfill method has traditionally been imposed on a particular mining operation by the need to provide a passive ground support, and more recently, to meet regulatory and environmental constraints by minimizing surface storage of tailings. Where cemented rock fill and hydraulic slurry fill were used, depending on whether high- or low-strength fill was required, paste fill is being implemented to maximize the benefits of full plant tailings disposal underground while achieving a high strength fill. Moreover, paste fill is being sought as a replacement to rock fill to simplify operations by freeing resources for production, and in particular, to realize cost savings which can be up to half those of other fill methods.

The selection of any backfill method will increasingly require a holistic view of an operation as additional demands are placed on mines to be compliant and cost-effective. This paper presents the advantages, disadvantages, and