



EMGOLD MINING CORPORATION

IDAHO - MARYLAND TECHNICAL REPORT

16.0 MINERAL PROCESSING & METALLURGICAL TESTING

There exists extensive background information on the metallurgical performance of the ores processed at the Idaho-Maryland and Brunswick properties, as summarized in the 2002 AMEC report. Each property had a milling circuit that incorporated crushing, grinding, gravity separation, sulfide flotation, and gold smelting/refining unit operations. In addition, the Idaho-Maryland mill contained a cyanidation plant with Merrill-Crowe recovery, and a smelting/refining circuit that treated flotation concentrates and sands from both mills. No milling facilities remain from past operations. An illustration and description of the Idaho-Maryland milling circuit is presented in Taggart (1954).

Since 2004, Emgold conducted metallurgical testing of drill cores and historic tailings.

16.1 Metallurgical Performance History

In the 2002 Technical Report, AMEC reviewed the mill operating statistics for 1934, 1936, 1937, 1938, 1941, and 1947. Results indicated stable overall gold recoveries and metallurgical response to gravity, flotation, and cyanidation:

- Overall gold recoveries ranged from 93.8% to 97.2%.
- Gold production using gravity recovery methods ranged from 61% to 69%, averaging approximately 65.4%.
- The ore contains approximately 1.5% to 2% sulfides. Gold produced via flotation of the sulfides ranged from 30.3% to 36.9% with an average of 33.4%.

Following flotation, the concentrate was reground to further liberate the gold. The remaining 1.2% of the total gold produced was achieved by treating the sands or coarse fraction from the flotation circuit tailings using cyanidation.

Graphite and scheelite containing ore zones have been encountered in the orebody. In the milling circuit, graphite reported to the flotation circuit and was successfully depressed using flotation reagents. Scheelite was recovered using gravity and flotation methods in the 1950s.

Juras and AMEC (2004) stated that overall gold recovery using modern technology would result in gold recoveries consistent with those achieved in the early milling circuits at the Idaho-Maryland mill. They also stated that gold recovery using current gravitational equipment may exceed the recoveries attained (i.e., average 65%) in the



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1930s and 1940s. Testwork to determine the maximum gold recovery potential using gravity separation and concentration was recommended by AMEC.

16.2 Metallurgical Testing Since 2004

In 2006, preliminary gravity and cyanide tests were conducted on small samples of drill core rejects to gain some understanding of the potential gold recoveries from mineralized veins (Kappes, Cassidy and Associates, 2006). Nine mineralized pulps from the 2003-2004 surface drilling programs were composited into one sample (with a weighted average head grade of 0.065 oz Au/st) and a gravity concentration test was performed with a Model SB40 Falcon Concentrator. Following this bottle roll cyanide tests were conducted. The combined results of both tests were of limited value because they came from small samples, but indicated that 98 percent of the gold may be recovered. Although these tests produced useful information, additional metallurgical testwork would be required using larger samples to fully characterize the veins and to accurately determine gold recoveries, cyanide consumption, and obtain other metallurgical information from drill cores or channel samples.

In 2006 and 2007, preliminary gravity separation, flotation and cyanide leach tests were conducted on small samples of historic mine tailings to gain some understanding of the potential gold recoveries from old tailings (Kappes, Cassidy and Associates, 2006). Gravity results using a Model SB40 Falcon Concentrator indicated that gold recoveries of up to 25 percent could be attained from pulverized tailings that were very fine-grained (80 percent by weight minus 200 Tyler mesh size) and had head grades of 0.128 oz Au/st. The results of initial flotation tests using a Denver D-1 Flotation machine suggested that 26 percent of the gold would be recovered from the flotation circuit. Cyanide soluble leach test results varied from 41-53 percent and provided some preliminary information on lime and cyanide consumption. A separate cyanide leach test on two samples of historic tailings produced gold recoveries of 50-60 percent (Dawson Metallurgical Laboratories, Inc. 2007). Although these tests produced useful information, additional sampling would be required to accurately predict the gold recoveries from historic mine tailings.

In 2004, preliminary gold recovery gravity tests utilizing both Knelson and Falcon lab concentrators were performed on bulk samples of old Idaho-Maryland tailings and highly mineralized material found on waste rock dumps (Grewal, 2004). Test recoveries using only gravity separation were generally in the range of 70% to 80%. This gravity testwork is of interest because it indicates that new gravity technology may be more efficient than the methods used during the historical operation; however, it is not possible to accurately correlate the origin of the samples with respect to the mine



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workings, and so the value of these initial results is limited. Once a gold resource is defined, additional gravity and general metallurgical testwork would be required to fully characterize the metallurgical response and properly estimate gold recovery. It is anticipated that gold recovery using modern technology should be either the same or better than historical recoveries.