Shaping the Future of Gold Refining with Sustainable Leaching using Glycine and Permanganate

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INTRODUCTION
- Produce 8.5 tonnes/yr of 24 karat gold
- Plant located in Selwyn Basin of the Tombstone Gold Belt, Yukon
- Pyrite ores with Carlin-type deposits are used

INNOVATION
- Replacement of conventional cyanide leaching with Potassium Permanganate and Glycine.
- Jet stream reactor to increase leaching efficiency and decrease leaching time

SOCIAL FACTORS
- Eliminate Cyanide Spills
- Globally Export Goods

ECONOMICS
- NPV: 2.99 billion
- Annual Profit: 247.8 million CAD (Years 0-10)
- 315 million CAD (Years 11+)
- IRR: 48%
- Plant Overhead Costs: 11.3%
- Indirect Costs: 16.2%
- Direct Costs: 67.5%
- Fixed Charges: 0.9%
- Production Costs: 75.7%
- General Expenses: 12%
- CAPEX: $76 million CAD
- OPEX: $405 million CAD

PROCESS OVERVIEW
- CRUSHING & WASHING
  - Size reduction of pyrite ores to 0.15 mm
- LIQUID-SOLID EXTRACTION
  - Gold-glycine complex separated from waste slurry
- ELECTRO-WINNING & REFINING
  - Refining using the Miller and Wohllwill process
- CRUSHING & LEACHING
  - Pyrite ores mined at existing mining facility
- LEACHING
  - Extraction of gold from ores to form gold-glycine complex
- CARBON ADSORPTION & ELUTION
  - Gold-glycine complex washed and purified
- ELECTRO-WINNING & REFINING
  - Refining using the Miller and Wohllwill process
- ELECTRO-WINNING & REFINING
  - Refining using the Miller and Wohllwill process

PLANT LAYOUT

ENVIRONMENT
- Air Pollutants
  - Originated from the leaching process
  - 16.04 tonnes CO2/year
- Liquid & Solid Waste
  - Originated from the liquid-solid extraction
  - 9435.5 tonnes of waste/year

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