

ARSENIC MANAGEMENT

Valuable gold, copper, cobalt and nickel resources can host significant quantities of arsenic. For instance:

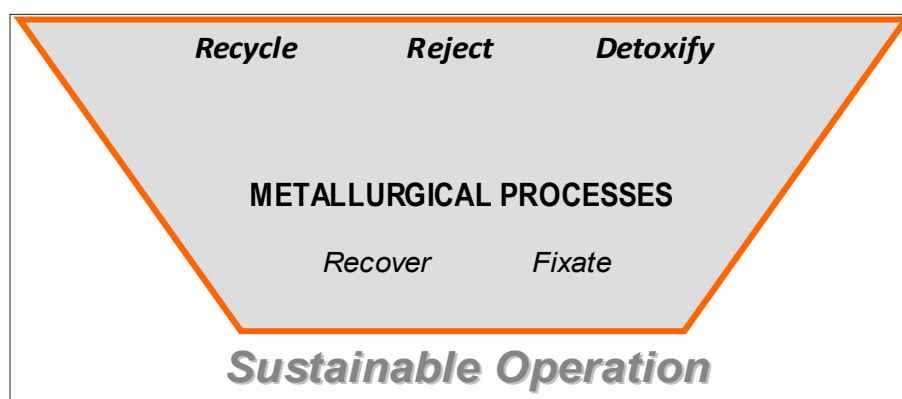
- The gold-arsenopyrite deposits of Red Lake, Yellowknife and Ashanti areas.
- The enargite-tetrahedrite deposits of El Indio and El Pachon regions.
- The unconformity or vein related nickel-cobalt-arsenide ores of Key Lake, Jabiluka, Ranger or Cobalt camps.

Stringent environmental regulations require arsenic management programs meaning sustainable arsenic practices are critical for profitable operation.



METALLURGICAL TREATMENT OF ARSENIC CONTAINING PRODUCTS

SGS Minerals Services' metallurgical group has successfully developed and completed numerous programs in which arsenic compounds have removed, rejected, recycled, fixed or detoxified. In doing so, we have resolved many of the difficult aspects of arsenic beneficiation, purification and stabilization.



This experience has helped many companies on the road to profitable, sustainable operation and regulatory compliance.

With our metallurgical expertise in flow-sheet development, pilot plant operation and our fully equipped, accredited analytical, mineralogical and environmental laboratories, SGS Minerals Services has a wealth of experience for your project.

RECOVERY PRODUCTION OF MARKETABLE ARSENIC COMPOUNDS

- Selective removal of arsenic minerals from impure compounds by flotation, re-leach/precipitation, crystallization of pure saleable sodium arsenate or copper arsenate
- Volatilization of pure arsenic compounds by roasting or precipitation

RECYCLING

- Remediation of arsenic-containing materials
- Investigation of arsenic behavior during processing
- Selection of hazardous arsenic materials for in-process stabilization or concentration

FIXATION

- Production of stabilized arsenic compounds for safe disposal
- Pressure or atmospheric leach technologies produce stable crystalline scorodite and/or ferric arsenate precipitates. Smelter dusts, copper refinery bleed solutions, refractory gold ores and Co-Ni-Zn arsenide ores are possible feeds.
- Cement- or bitumen-stabilized arsenic waste products can be safely disposed.

ANALYSIS OF ARSENIC-BEARING MATERIALS

SGS Minerals Services has many methods to characterize arsenic and its related impact:

CHEMISTRY

- Total arsenic by ICP-AES, ICP-MS, STP-GFAAS, GFAAS, GHAAS, XRF
- Analytical range 1 ppb (solution) to 100% (solid)
- Arsenic speciation (As⁺³, As⁺⁵) by hydride AA in all matrices
- Analytical range 0.01 mg/L to 1%
- Toxic forms: organic and inorganic



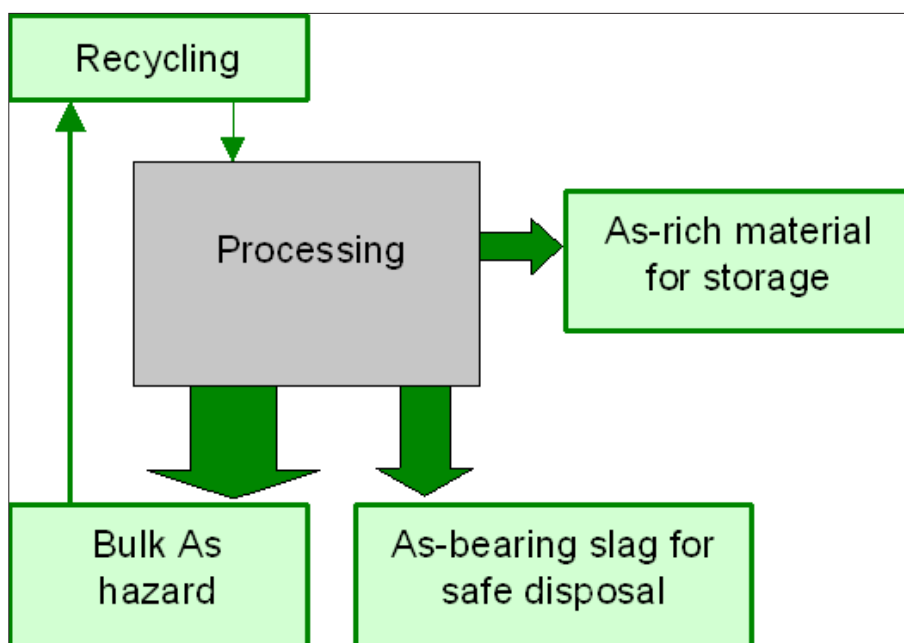
Gold in arsenopyrite

MINERALOGY

- Arsenic mineral phase speciation, crystallinity, particle size and mineral chemistry
- Arsenic deportment in solid ores and test products
- Arsenic mineral associations and intergrowth textures
- Investigations performed using integrated XRD, QEMSCAN, optical microscopy, scanning electronic microscopy and electron microprobe analysis.

STABILITY TESTING

- Arsenic solubility via leach tests
- TCLP: Toxicity characteristic leaching procedure
- SPLP: Synthetic precipitation leaching procedures
- MWMP: Meteoric water mobility procedure
- Long term stability
- Column extraction
- Aging tests
- Weathering tests



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