

Managing Cyanide Streams with Wireless Analytical Measurements

RESULTS

- Detect Potential Leaks
- Perfect for Remote Locations
- Rapid Response to Process Changes
- Reliable Wireless Diagnostics



THE PROBLEM

Precious metals such as gold and silver are processed using cyanide compounds. Cyanide is used for primary leaching of precious metals from large quantities of raw ore due to the chemical's exceptional ability to bind with those metals and concentrate them in the liquid phase. Frequently cyanide is employed by simply placing the crushed ore on a simple plastic liner and allowing the cyanide solution to permeate the ore (heap leaching). Using cyanide effectively in the leaching process requires maintaining the pH of the solution above 11 (see ADS 3300-08), but manually measuring the pH of this solution can be time consuming and possibly hazardous to plant personnel. Remote and automatic pH measurements are desirable, but the ore location can be far removed from other instrumentation so running cable for continuous analyzers can be cost prohibitive.

Spent cyanide streams are reused many times but eventually must be treated and discharged. Unfortunately, cyanide is highly toxic in both the gaseous form HCN (hydrogen cyanide) and salt form (e.g. sodium, potassium cyanide and others), so destruction via oxidation can be the only viable manner to discharge the waste stream. Chlorine is a common oxidant used for cyanide destruction and the process can be easily monitored by measuring the oxidation reduction potential (ORP) of the waste stream (see ADS 3300-01). Since simple chlorine addition will reduce the pH and could result in the discharge of HCN, pH is also monitored during the oxidation process. The process requires constant monitoring to prevent the discharge of cyanide in liquid or gas form.

THE MEASUREMENTS

Online pH and ORP measurements are generally accomplished using sensors of very similar design. The sensor contains a measurement electrode composed of pH sensitive glass or platinum and a reference electrode based on the silver/silver chloride system. Both of these electrodes must contact the measured process solution and be in proper working order to provide a good analytical measurement of the process conditions. Mining applications contain fine ore particles that can coat the sensor and cyanide which can interfere with the silver reference system. Rosemount Analytical's pH and ORP sensors and instruments continuously diagnose sensor health and indicate when sensors develop coating or are being chemically attacked by the cyanide in solution. These diagnostics are used to schedule effective maintenance and help diagnose problems, reducing labor costs.

Rosemount Analytical manufactures several different models of pH and ORP sensors, including the PERpH-X™ line that includes a replaceable teflon reference junction and a refillable poison-resistant electrolyte solution. The high performance PERpH-X design also features the robust ACCUGLASS™ formulation that withstands exposure to temperatures up to 155°C. The 1" NPT model 3500PR is the recommended sensor for mining solutions containing cyanide.

WIRELESS

One of the largest installation expenses for field instruments is running power and signal wiring. Studies have shown that these costs can be reduced up to 90% by using wireless devices. Rosemount Analytical's Wireless Model 6081-P is ideal for monitoring the pH and ORP of effluent streams over widely dispersed areas. The update rate is user configurable from 1 to 600 seconds, and at a one minute setting, the power module is estimated to last more than two years. The Model 6081-P uses Emerson's Self-Organizing Network

technology whereby each instrument acts as a relay station for all other instruments in range. This enhances reliability as the wireless network automatically changes transmission paths when temporary conditions take individual instruments out of service. The Model 6081-P transmits all process data (including diagnostics) using *WirelessHART*® ver. 7 at a frequency of 2.4 GHz and can directly transmit over distances as large as 600 ft to a compatible wireless gateway.

SENSOR & INSTRUMENTATION

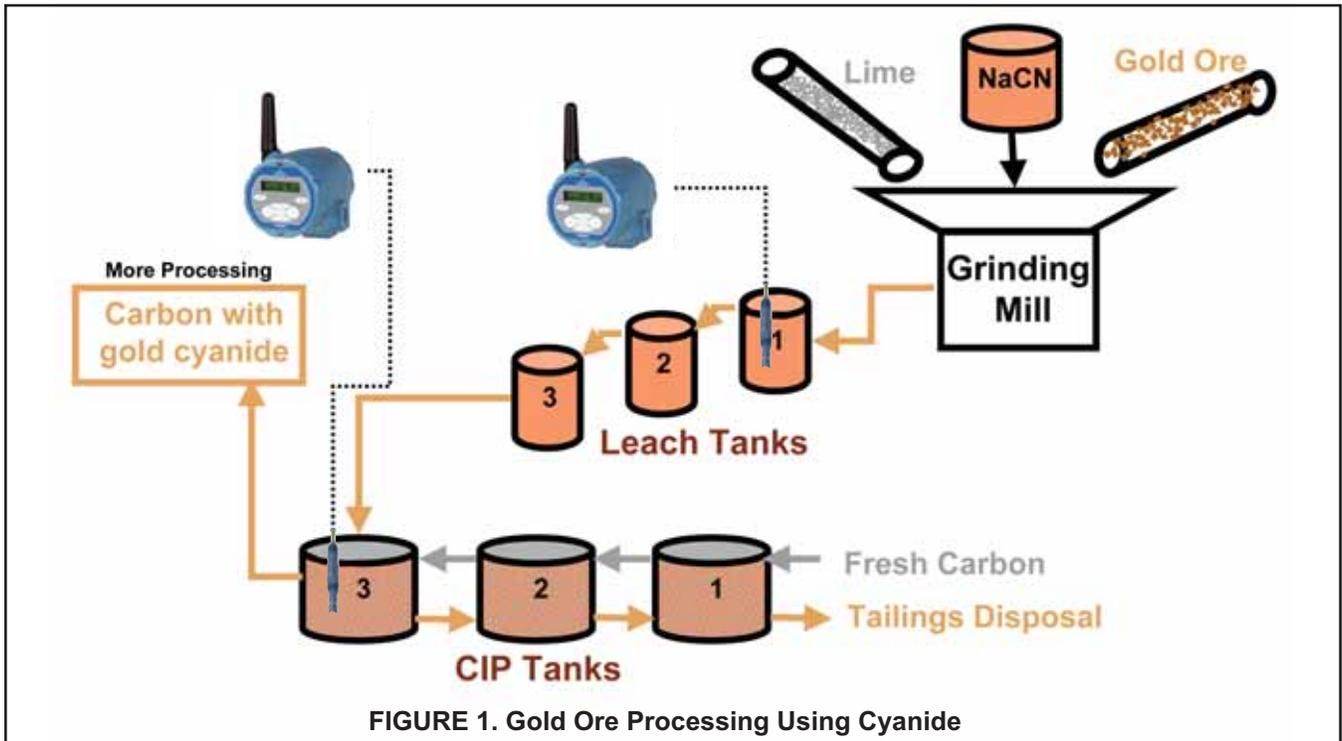
3500 pH and ORP Sensor

- Fast, Accurate, & Stable Measurement
- Rugged, Versatile Design
- Quick Connect Cable or Integral Cable
- Integral Pre-amplifier Option
- Long Lasting Rebuildable Reference
- SOLUTIONS Compliant Design



6081 pH Wireless Transmitter

- Self-Organizing Network for High Data Reliability and Network Stability
- SMART Sensor Enabled
- Compatible with 1420 Wireless Gateway and *WirelessHART*® networks
- Industry Leading Wireless Security
- Continuous Diagnostics Monitor Sensor Performance and Health



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