

## COST EFFECTIVE, REALTIME, ON-LINE COPPER CONCENTRATION ASSAYS

Concentrations of copper in leach lines often can be estimated visually. A more saturated blue color tint usually will indicate a higher concentration of copper. Obviously, the question of "higher in relation to what" comes up. All things being equal, the higher can be compared with samples further up stream, where concentrations are lower, and visa versa. However, it is one thing to get a "feel" for concentrations and quite another to obtain accurate measurements of concentration. Most often, the need for accurate concentration measurements has been met by use of relatively expensive instrumentation, such as X-ray diffraction systems.

Now, a new assaying procedure for measuring copper concentration has been developed. This quantitative procedure was developed by the use of inexpensive miniature fiber optic spectrometers. The procedure has been validated by measurements using samples from five different properties.

Although spectrometers have been used in laboratories for many decades for chemical and colorimetric analyses, such laboratory instruments have not been utilized for field assays. That is because conventional spectrometers are both expensive and more suitable to laboratory environs. Also, conventional spectrometers are more applicable for handling discrete sampling than for on-line applications. Now, with inexpensive, robust miniature fiber optic spectrometers available, not only can a spectrometer be used for on-line assaying of each leach line, but they can be relied upon for trouble-free operation over long time periods. Further, on-line assays can be done with the spectrometers located at a central location, with the copper assaying information being brought in by fiber optic lines.

Certainly, to achieve high precision in assays, spectrometer systems need to be calibrated. But, with valid calibration, assay results have been within results from conventional assays. For example, tests run on concentration levels of between 30 grams/liter and 50 grams/liter show assays results of less than 0.5 grams/liter variation. The chart included here is typical of results.

Results of many tests have validated the accuracies of assays made by miniature fiber optic spectrometers. Fully as important from a cost effective standpoint is the utility of using these miniature spectrometers. An investment in miniature fiber optic spectrometers can buy a lot. Starting at the leach line itself, sampling now become automatic with flow cells. Data transfer is fast and safe via fiber optic lines. At the actual spectrometer bank, instrument maintenance would be at a minimum because of no moving parts in the spectrometers. Then, at the display, all assays are shown as actual concentration levels as continua in real time.

All in all, an investment could be promptly justified. Such an investment need not be made until the value of this procedure was proven out in a company's assay lab. Because these miniature fiber optic spectrometers can also be cost effective as laboratory instruments, their use could be checked out for the price of an individual spectrometer plus fiber optic input lines in a company's chem lab. This is certainly a worthwhile consideration, given the potential benefits.

Incidentally, do not despair if you are not involved with concentration assays of copper leach lines; the system described can be applied to many flow lines, from foods and beverages to chemical processes.

