THE USE OF TRACER SOLUTIONS TO MEASURE THE SLURRY FLOWRATE IN A PIPE.

Equipment required: A device for delivering a small solution flow at a constant flowrate, beakers, filters, measuring cylinders, stopwatch, Marcy scales etc. (The assay laboratory will need to have the equipment and standards to be able to assay for the metal used in the test procedure.)

Procedure:

1. The basic procedure is to feed a relatively strong solution of a metal salt into the stream to be tested. This needs to be done slowly at a constant flowrate. Samples collected downstream are then assayed and the dilution is used to calculate the tonnage.
2. Set up the equipment for delivering the start solution and measure the flowrate at the start of the test. Repeat the flowrate measurement at the end of the test.
3. After starting to feed the strong solution into the slurry, allow enough time for the metal salt to arrive at the sample point and then commence taking samples (at say 10 second intervals). Take six to eight samples of slurry and filter them immediately. (Allow for a line velocity of 3.0 m/sec to 3.6 m/sec. to calculate when sampling should commence.)
4. If determining a tonnage and not a flowrate, use the Marcy scales to determine the pulp density of the slurry stream.
5. Submit the downstream solution samples and samples of the start solution for assay of the metal used.
6. Use the known flowrate and the start and finish assays to calculate the flowrate of the water in the slurry.

Notes:

1. In choosing a metal salt to use for the procedure, select one where the background solution level in plant slurries is low. (Avoid using ferrous or ferric salts.) Avoid using copper salts as copper will cement onto any ball chips in the slurry. Zinc sulphate or lead nitrate would be suitable for most applications. Salt (sodium chloride) can also be used. Before starting any testwork, check the background levels of the metal to be used and, if necessary, apply a correction factor to account for the background.

2. Avoid using diaphragm pumps or peristaltic pumps to pump the start solution into the slurry line.
3. A feed from a constant head tank should give a suitable flow.
4. Test the method on a slurry line fitted with a flowmeter if possible.

Example:

Mix a 5 litre solution of zinc sulphate to give a zinc concentration of about 1% ie 10,000 ppm. Set the solution flow into the start position at, say, 1.2 litres per minute. Now, say the downstream zinc assay stabilises at 16 ppm, then:

Flow in = Flow out

$1.2 \times 10000 = q \times 16$

$$q = \frac{1.2 \times 10000}{16}$$

= 750 litres per minute of water

= 45 cubic metres per hour of water