

## 15.6

START-UP PROCEDURE

As summarized from INCO SO<sub>2</sub>/air operations manual.

1. Fill reactor #1 with slurry.
2. Check reactor slurry discharge dart valves are in the desired position for backfill operation or final tailings position.
3. Check that the pH controllers is at the desired set point and all air activated solenoid valves have available instrument air.
4. Check the lime loop distribution pump is running and that the isolating valves ahead of the lime control valve are open.
5. Start the agitators.
6. Check that water supply to spray chamber separator is open.
7. Check that blower fan suction and discharge valves are all open.
8. Start the blowers.
9. Determine required copper sulphate flowrate in Reactor #1, check the inlet and outlet valves are open and start metering pump. Adjust flow to 3 x normal rate to ensure adequate Cu<sup>2+</sup> to start the reaction.
10. Start carbon safety screen and associated spray water.

11. Start the vertical cyanide destruction feed pump.
12. Sample reactor #1 for free cyanide content.
13. If cyanide is low, reduce copper sulphate flow to pre-determined setting.

When the roaster circuit has stopped or the free cyanide level ( $CN_{WAD}$ ) in reactor #1 is more than 10 ppm, the cyanide destruction circuit will need to be placed on hold until such time as conditions allow the process to restart.

## 15.7

### ROUTINE CHECKS AND TROUBLESHOOTING

#### 15.7.1

##### Routine Checks

1. Take regular 'grab' samples from the first reactor to determine the  $CN_{WAD}$  concentration in the incoming feed. The Picric acid method is used for this determination.
2. Maintain data sheets of CIP adsorption tailing assays as well as cyanide destruction tailings assays.

This information will provide necessary information for troubleshooting.

3. Check and maintain copper sulphate flowrates into the reactors for optimum catalytic activity.
4. Check and maintain the correct pH in the first reactor.
5. Clean pH probe on a regular basis to ensure correct calibration in pH control operation.

6. Maintain correct sampling procedure for all grab and composite samples.
7. Check gas blowers, mixers and temperature indicators are working correctly.
8. Take regular 'grab' samples from the second reactor to determine the  $CN_{WAD}$  concentration in the cyanide destruction discharge. Use the Picric acid method for this determination.

#### 15.7.2 Troubleshooting

<u>Problem</u>	<u>Likely Cause</u>
Low pH in Reactor 1	<ul style="list-style-type: none"> <li>- Lime valve plugged</li> <li>- Lime distribution pumps turned off</li> <li>- pH probe faulty</li> <li>- Lime tank empty</li> </ul>
High pH in Reactor 1	<ul style="list-style-type: none"> <li>- No <math>SO_2</math> roaster gas being added</li> <li>- Instrument air controlling lime feed valve turned off</li> <li>- Valve to solenoid valve closed</li> <li>- pH probe faulty</li> </ul>

**High  $CN_{VAD}$  in Reactor 1**

- Insufficient  $SO_2$  for incoming cyanide concentration
- Roaster off-line, no  $SO_2$  being added.
- Blowers/mixers turned off
- Insufficient copper sulphate (catalyst)
- Low sulphur ore being fed to roaster circuit

**High total cyanide in tails**

- Iron cyanide complex not being precipitated
- Insufficient copper sulphate addition
- Incorrect pH in Reactor 1 and 2

For further troubleshooting problems please refer to INCO  $SO_2$  Cyanide Destruction Circuit, Operating Manual.

**15.8 OPERATIONS MAINTENANCE**

Like all industrial equipment, some periodic maintenance will be required on the cyanide destruction system. Operators will be required to perform the following:

- On shut-downs, perform regular checks and clean-up of the pH probes in the reactors.
- Maintenance of the auxiliary  $SO_2$  system for use when the roaster section is down.

15.9

**CYANIDE DESTRUCTION SAFETY****Sulphur Dioxide, SO<sub>2</sub>**

Can cause irritation to eyes, nose and lungs. If burning feeling in eyes, nose or lungs, the area should be ventilated and the source of the gas leak found and eliminated.

**Milk of Lime, CaO**

Milk of lime is caustic and, particularly if hot, can cause damage to the skin. The eyes are highly sensitive to lime.

**USE EXTREME CAUTION WHEN HANDLING LIME****pH**

If the pH in the reactors is low (<7.5) evolution of HCN gas can occur.

15.10

**SUPPORT EQUIPMENT**

The cyanide destruction circuit is supported by several other circuits which must be operating properly for pulp tailings treatment to perform in an efficient and safe manner. It is the operator's responsibility to check on the status of this support equipment.

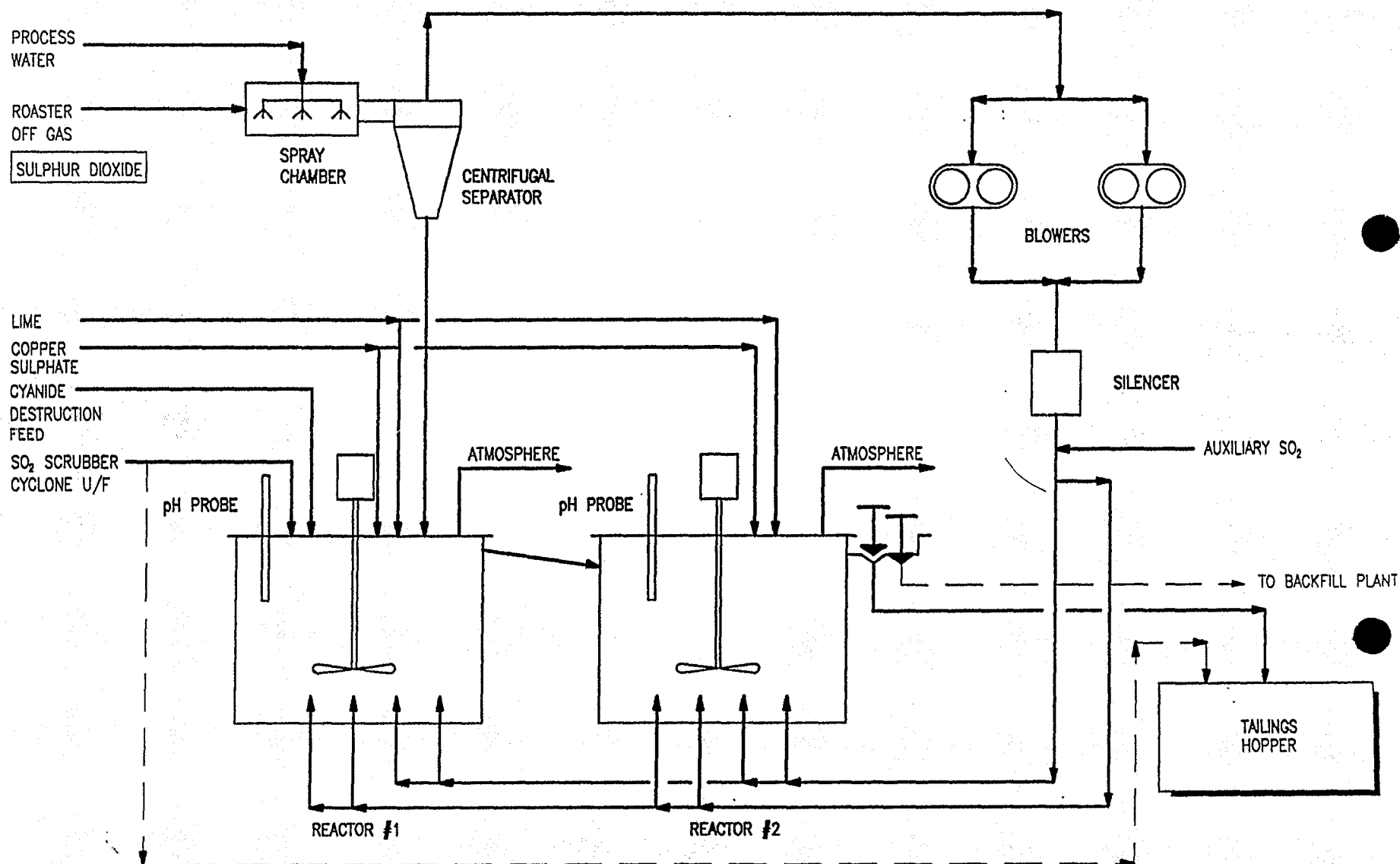
**Equipment used:**

- the air compressors (plant and instrument air).

- the lime slaking system, distribution pump and closed loop supply system.
- fluid bed roaster.
- the auxiliary liquified SO<sub>2</sub> system.
- the copper sulphate mixing system.

**15.11****JOB DESCRIPTION**

The Cyanide Destruction Circuit operator is responsible for the safe and efficient operation of the circuit. Duties that must be carried out include the recording and monitoring of process variables and parameters as well as general housekeeping within the cyanide destruction area. It is the operator's responsibility to ensure that all equipment in the circuit is operating safely and in accordance with operation goals. Routine checks and troubleshooting must be done on an ongoing basis with any abnormal occurrences reported and corrected as soon as possible.



**CYANIDE DESTRUCTION CIRCUIT FLOWSHEET**  
**FIGURE 15.1**