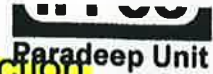


Start-up, Shut down & Operational Procedure of Reaction Section.**Start up**

1. Check that all the reactor manholes are in tightly closed condition.
2. Start filling the reactor as well as Vacuum Cooler Seal Tank with Weak Phosphoric Acid.
3. Ensure that coupling guards of all the rotary equipments are perfectly fixed at their positions.
4. If there is enough liquid level in reactor (apprx. 2m) to submerge bottom blades of the agitators start all agitators.
5. Open Water valves to Presrubber and Fumes Scrubber spray system
6. Start Fumes Scrubber Fan and Scrubber sump pumps to dispose water to Belt filters.
7. Start adding defoamer to predefined locations of reactor.
8. Start adding pond water to the mixing Tee from Filtration section through Return acid lines.
9. Start Reactor Feed Pump and open isolation valves of Sulphuric Acid line. Start feeding rock slurry and Sulphuric Acid with feed control through DCS. Don't allow slurry temp. beyond 75 deg C at any time. Continue with batch wise reaction to control the temp.
10. Collect the reactor slurry sample and get it analyzed on half an hour basis till plant is stabilized.
11. Start Booster pump to supply seal water to vacuum cooler circulators.
12. When reactor slurry reaches the operating liquid level of 4700 mm start activity of vacuum cooler system.
13. Make Precondenser seal tank level 70-80% and start Precondenser circulation pump.
14. Open cooling water to vacuum cooler condenser.
15. Start one Vacuum cooler system, by starting one recirculation pump and pulling the set of vacuum on the system by opening MP steam valves to the ejector system.
16. Start defoamer dosing to the discharge line of Vacuum cooler circulator.
17. When the level in Vacuum Cooler Seal Tank reach to submerge bottom blades of the agitators, start them.
18. When the levels in Adjustment Tank & Filter Feed Tank reach to submerge bottom blades of the agitators, start them.
19. When the level in Filter Feed Tank reaches to 40% ask concerned person in Filtration area to start Filter feed pumps in recirculation.
20. Switch over to return acid addition to the mixing Tee from pond water as soon as filtration starts.
21. Monitor reactor free board level on continuous basis.

22. Start other Vacuum cooler systems one by one as per requirement, first one.

Operation

1. Monitor the reactor free board level on hourly basis.
2. Collect reactor slurry sample and get it analyzed on hourly basis.
3. Monitor current drawn by all the rotary equipments.
4. Ensure cleaning of fume scrubber pads on regular basis.
5. Monitor the water flow to the scrubbers. If it becomes less, arrange cleaning of spray nozzles.
6. Monitor Vacuum cooler system continuously for smooth running of the plant.

Shut down:

1. Check reactor level. If level is normal stop feeding rock slurry and Sulphuric acid. Stop concerned equipments and close the valves.
2. Stop all sample collections at this time.
3. Stop adding defoamer.
4. Ensure no return acid flow to reactor from filtration section.
5. Stop steam flow to the ejector.
6. Open the vacuum bleed valves.
7. Stop vacuum cooler circulator pump and close the seal water line of the pump.
8. Close the knife gate valve and open drain valve in the suction line.
9. Start the sump pump and pump the slurry to reactor.

Emergency Shut Down

1. Use field LCS or DCS whichever is closest, to stop the equipment.
2. Stop Sulphuric Acid & Rock slurry feed. Stop concerned equipments and close the valves.
3. Stop adding defoamer.
4. Unless vacuum cooler circulator pump is involved in an emergency, follow the normal Shut down procedure.