Environment & Safety Protection Systems

Ixom Port Kembla has a number of purpose designed systems in place to ensure sustainable operation, protection of the environment and protection of people. Below is a brief description of how each of these systems operates.

Wastewater Treatment Plant

The site operates a comprehensive wastewater treatment system which takes all liquid waste generated in the SARP, SBS, acid dilution and tanker loading operations and treats it prior to discharge. All liquid waste generated on the site is discharged via the sites single licensed discharge point described as LDP4 in the site's EPA licence.

Wastewater Treatment Plant Process

1. Wastewater is generated in the front end (gas cooling and cleaning) of the SARP. This wastewater is collected via sealed drain pipes in a purpose built treatment pit where pH (acidity or alkalinity) of the water is monitored by a computer control system and the pH automatically adjusted to bring it into the licensed range of 6.5<pH<8.5.<></pH<8.5.<> to 8.5
2. Once the pH is within the above range the wastewater is pumped into the next stage of the treatment plant for further cleaning
3. In this next stage the wastewater is clarified using purposed designed clarifying and filtration equipment to remove solid particulate material and produce a clean, clear wastewater stream
4. This clean wastewater is then held in a large storage tank where it can be partially reused in the process and pumped to the final stage of treatment prior to discharge
5. The final stage before discharge involves storage of the clean wastewater in a smaller batch tank in which a further stage of automatic pH monitoring and adjustment is made as required
6. Once the system registers the wastewater in this tank as within the licensed pH range, and only then, the tank discharge valve is opened to allow the wastewater to be discharged via the site's only liquid discharge point, LDP4
7. This discharge point also continuously monitors the pH of the wastewater being discharged along with total suspended solids (TSS) and flow rate and volume
8. The above monitoring results are recorded every time the system discharges and are reported on this website weekly and also as required to the EPA. LDP4 is licensed for pH within a specific range and TSS within specific limits for both wet and dry weather.
9. In addition to wastewater from the SARP, all liquid waste collected from the SBS plant, any rainfall falling within the manufacturing plant bunded areas and all liquid collected in the storage tank and tanker loading bunds are collected and handled through this treatment system.

SARP Emergency Trip System

Unique to Ixom Port Kembla SARP is a dedicated and purpose designed emergency trip system. This system is designed to operate automatically any time the SARP stops unexpectedly. This can happen in extreme weather events such as severe electrical storms and extremely high wind events and is usually the result of instantaneous loss of electrical power. Other emergency events that activate the system can include operator intervention if an emergency is manually detected, a trip on the plant designed to protect the plant itself from damage or another control system failure. The trip system is independent of the normal plant operating system and is 'fail safe', meaning that it will take over in an emergency situation and ensure the plant stops in a safe and environmentally sound manner.

SARP Emergency Trip System Process

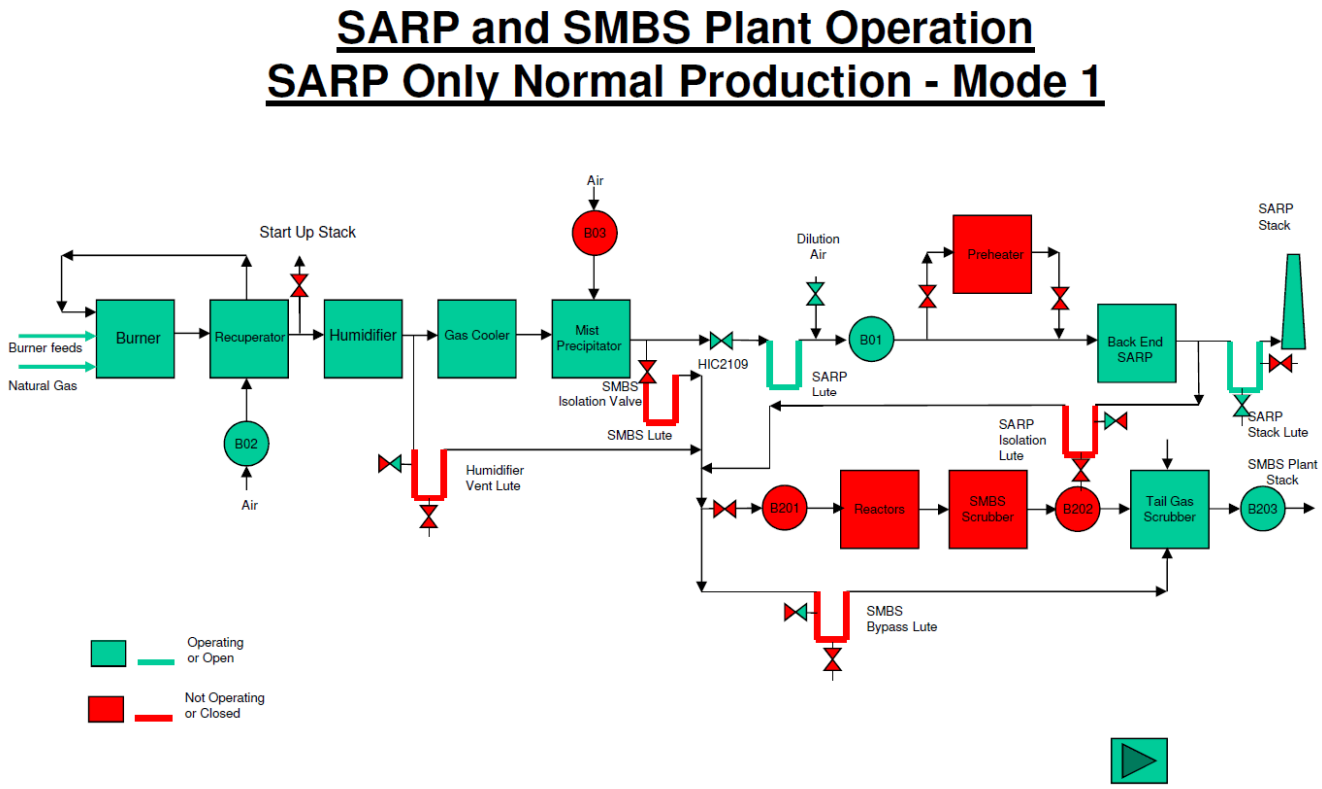
Whenever the main plant blower in the SARP stops for any reason this constitutes a plant 'trip'. This could be driven by an unexpected event such as instantaneous power loss, a trip situation generated by the plant control system itself designed to protect plant equipment or safe operations, a manual emergency stop by plant operations personnel or a normal plant shut down.

When such a trip event is detected by the emergency trip system several specially designed and installed emergency systems take over as follows:

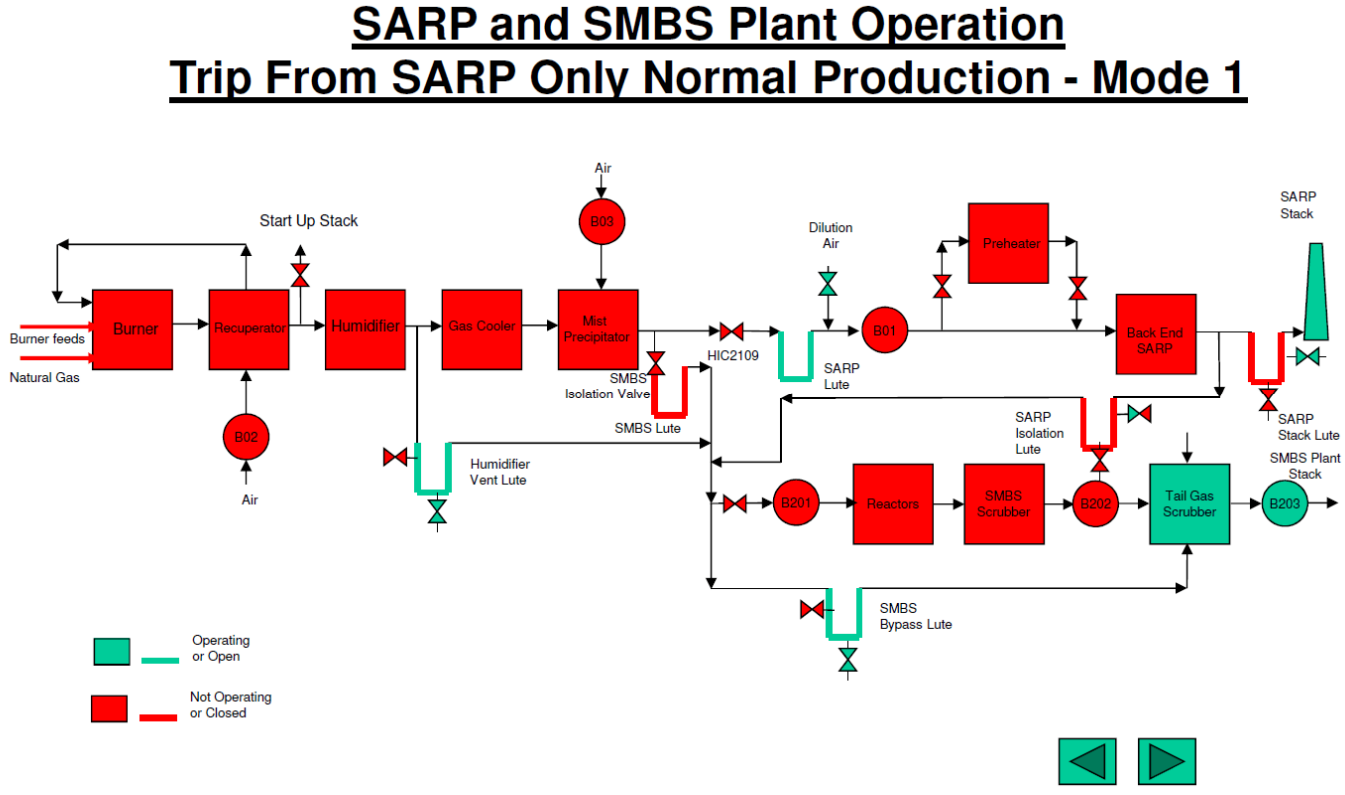
1. All plant feeds, including spent alkylation acid, molten sulphur and natural gas shut down immediately. This ensures no more process gas can be generated
2. Process gas, containing SO_2, is re-directed from the normal flow path into the plant to the SBS plant tail gas scrubber (TGS). This ensures that all process gas contained in the burner and gas cleaning vessels is removed from the plant and 'scrubbed' using the TGS which is capable of dealing with all the SO_2 contained in this gas stream
3. At the same time as the trip system activates, the TGS is 'dosed' with a defined amount of additional caustic (sodium hydroxide - an alkaline liquid) solution via an emergency dump tank to ensure the TGS is ready to receive the increased SO_2 load from the gas cleaning section of the SARP
4. This re-direction of process gas is achieved by a series of fibreglass 'lutes' (these are sections of pipe that work in a similar way to an 'S' bend under your kitchen sink to stop sewer smell from flowing back up from the sewer mains into your house) connected by fibreglass pipes. When the emergency system activates water dump tanks and valves operate to instantaneously empty and fill these lutes with water to block gas flow to the plant and re-direct it to the scrubbing system
5. The above process is controlled by a separate hard-wired control system which takes over control of the plant from the normal operating control system and tells the plant what to do. While this system operates the operations personnel on site are locked out of the system for the first 15 minutes which is enough time for the process gas to be removed from the gas cleaning part of the plant
6. When this part of the trip system operates you may see a 'plume' from the SMBS plant stack (LDP2) which contains mainly water vapour and fine 'smoke' from the burner. This stack is continuously monitored for SO_2 and the scrubbing system is easily able to remove all SO_2 from the gas stream before it is discharged via this stack
7. After this initial 15 minutes of operation control is released back to the operations personnel and the gas stream can be re-directed through the gas cleaning system which removes the water vapour and fine 'smoke' from the gas. At this stage the visible plume disappears
8. In addition to removing process gas from the gas cleaning section of the plant, the emergency system also blocks gas flow from being discharged via the SARP stack (LDP1) so that any in-process gas inside the SARP is locked inside the plant.
9. Prior to restart of the SARP, all this locked-in process gas is removed from the plant by the SMBS plant TGS and scrubbed in the same way as the initial emergency process. Once this purging of gas from the SARP is complete the re-start process can commence.

There are a number of different modes of operation of the emergency trip system to cater for the different operational modes of the two manufacturing plants (the SARP and SBS plants). An example of the emergency process is included below.

SARP: Normal production operation diagram



SARP: Emergency trip system in operation diagram



Tank Farm and Tanker Loading/Unloading Bunds

The term ‘bund’ is used to describe the secondary containment systems used to contain any liquid that may be collected around storage tanks, plant areas and tanker loading areas and prevent this liquid from entering the environment in an uncontrolled manner. Ixom Port Kembla has bunds installed around all of its chemical storage tanks, operational plants and tanker loading/unloading systems for this purpose.

Key Points about Bunds

- The bunds used at Port Kembla are designed to meet regulatory requirements and as such are capable of holding at least 110% of the capacity of the largest tank inside them. This means that if the entire contents of a full tank were to be spilled, all of this liquid would be contained by the bunded area and nothing would be lost to the environment
- The bunds are designed to be able to hold the chemical product stored in the tanks which are housed within them. At Ixom Port Kembla this is predominantly sulphuric acid and in most cases the bunds are constructed from concrete which can contain the acid, if spilled, and is strong enough to hold the required volume. In some special cases, such as dilute acid storage, the tank bunds are lined with a specialised acid resistant coating material to protect the concrete itself from acid attack
- In the case of operational and tanker loading/unloading areas similar bunds are in place to stop any spilled chemical reaching the environment - by stopping it from escaping from plant areas and flowing into water ways and/or preventing the chemical being absorbed by the soil beneath or surrounding the operational area.
- For tanker loading/unloading operations the bunds are constructed from concrete and lined with a special coating so they are resistant to the product (sulphuric acid) at various concentrations and also resistant to mechanical wear produced by road tankers driving in and out. In addition the capacity of the bunds in these applications is such that they can contain more than the entire volume of the largest tanker which may be loaded inside it. This means that, in the unlikely event that a tanker was to completely fail, all of the contents of the tanker would be contained by the bunded area thereby preventing any chemical from escaping into the environment
- All rainwater collected inside the bunded areas is collected, tested for pH and pH adjusted (if required) to ensure it is the range 6.5<pH</pH to 8.5
- Any chemical spill collected in these bunds is recovered by pump out and treated through the onsite wastewater treatment plant or recycled on site
- All rainfall and any spilled chemical material collected inside the process plant bunded areas is collected in the main plant wastewater system and treated prior to discharge via the sites licensed discharge point, LDP4.

General Environmental & Safety Systems

In addition to the specific dedicated systems previously mentioned, the site operates in compliance with all regulatory standards and legislative requirements.

- Processes are designed and risk assessed to ensure they are fit for purpose, the risks associated with operating such processes are well understood and appropriate controls are in place to ensure those risks are properly managed
- All systems in the site's operations which are in place to protect people and the environment operate as fail safe systems. This means that in the event of an emergency situation such as a power or compressed air loss, such systems will fail in order to ensure the system is safe. For example, a valve which is designed to discharge wastewater would, when discharging, be held open using power or air. In the event that the system shut down unexpectedly because the power or air systems were lost, the valve will spring closed - i.e. it will return to the safe, closed position
- Maintenance systems are in place and administered by suitably trained and skilled personnel to ensure all plant systems, including safety systems, are appropriately maintained and tested
- Plant operations personnel are all fully qualified and trained to carry out their duties in plant operations as well as to respond in the event of an emergency situation
- All critical parameters on the operational plants are continuously monitored, recorded and alarmed to alert operations personnel to any variation from normal plant operating set points. These processes are controlled by complex computer control systems which are designed specifically for the duty.