THE 10 PROCESS SAFETY PRINCIPLES

1. **The asset operating manager is responsible for its overall integrity:** The asset manager is the leader of all asset employees. Assets include all related activities e.g. laboratories, logistics, buildings and third party activities. In this role the asset manager has the full responsibility for all human and technical aspects of the asset. His first priority is the health and safety of all its employees, of the contractors, the third parties, the public as well as the environment that could be impacted by the asset activities. He has to ensure that the right organisation is in place and the adequate resources are available for maintaining a good integrity level in the asset. He has to visibly promote and encourage all actions that will improve the asset integrity and lead the PSM steering team related to his assets.

2. **The asset engineers are responsible for maintaining the asset and protective systems integrity:** Maintaining assets and protective systems at site is one of the most important requirements for Process Safety. Assets and Protective Systems shall be systematically identified to ensure that each of them is maintained correctly and the responsibility for maintaining the integrity of the assets and Protective Systems has been clearly defined. There shall be a system in place to ensure that the maintenance activities are planned and scheduled and take into consideration the statutory requirements, best engineering practices, manufacturer's recommendations and past site experiences with the assets. Appropriate systems should be in place to analyse results from integrity inspections and tests and identify corrective actions to improve the asset integrity.

3. **The responsibilities in the organisation for defining and maintaining the correct operating envelopes must be clear:** Operating envelopes consist of a range of values for parameters (pressure, temperature, concentrations of components, pH…) within which the process has to be kept and controlled for safe operation. For all facilities, the site/asset competent (technical) authority has defined the process parameters constituting the operating envelopes, has set the limits for safe operation and defined the risk associated with long term as well as short term excursions.

4. **Operating procedures and envelopes must be observed. Deviations must be reported and investigated:** Operating procedures should be the backbone of our safety management systems. They must be well written, regularly reviewed and updated if required. All relevant staff

must be trained in their use. Failure to follow operating procedures is not seen as acceptable. All deviations must be reported and investigated. Operating envelopes define the safe range of operation of our assets. Operation outside of these envelopes is high risk and should not be the norm. In exceptional circumstances it may be necessary to operate outside the normal Operating envelope, this can only be done after a risk assessment appropriate management of change has been completed which involved all relevant operating staff.

5. **Any changes must be properly risk assessed and subjected to MOC procedures:** Each facility has a robust and comprehensive MOC process in place defining the changes that must be risk assessed, how this should be done and the administrative controls in place to ensure that the site MOC procedure is systematically applied before changes can be commissioned. All along their life cycle, operations facilities are subject to numerous changes that can put at risk operations integrity. Such changes, permanent or temporary, can not proceed unless they have been formally authorised, after the risks arising from these changes have been identified, evaluated, addressed and controlled at an acceptable level.

6. **Process hazards are systematically identified, risk assessed, reviewed and managed:** The hazard identification and risk analysis system is the key principle in safe operations to make sure that risks to employees, public, environment and assets are controlled within the organisation to an acceptable level. The identification of Process Hazards allows sites to operate within design. Management of process hazards is a continuous process subject to periodic review.

7. **All assets must be subject to periodic inspection designed to ensure their integrity and the reliability of their protective systems:** Proper asset management is the inspection/maintenance of physical assets in the workplace thus ensuring optimum reliability/cost performance. Inspections of appropriate areas ensures:
   - equipment is designed/constructed/installed and tested according to all applicable regulations
   - equipment is fit for taking into service and operating in line with SHE standards
   - equipment stays suitable for safe and reliable operation in line with legal requirements
   - trip and alarm testing
   - electrical classification.

An effective engineering change management process is essential to ensure risks are managed when new assets are introduced (see principle PS# 5).

8. **Operations must always place the safe operation or shutdown of the asset ahead of production:** The safe operation of the plant is the #1 priority for the operating teams. Operating teams must be equipped with the knowledge to recognise when the plant is outside of its acceptable operating range and know what actions to take to bring it back to a safe operating position, which may include shutting down the plant. Maintaining production at the expense of safety is not an option.

9. **When in doubt the asset must always be taken to its safest state:** The operating teams must operate the plants at all times without taking operational risks which could expose employees, the public and the environment to danger. The operating teams must have the training and confidence to identify when operations are not the norm and action is to be taken which may require a reduction in production rates or a plant shutdown.

10. **We have emergency plans based on assessed risks which are regularly tested:** Management personnel at each facility have systematically determined the major accident scenarios for their site. Plans are in place to ensure that adequate resources (including equipment and personnel) are available to respond to identified scenarios. Emergency plans are tested on a regular basis. These drills include both internal and external resources to ensure adequate resources and abilities.

END OF NOTE