

Phosgene Safety Practices

for design, production and processing

Part 2

Key elements of safety practices - long version

Section1

Phosgene Safety Management System

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III caveat

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1 Phosgene safety management system

Central to phosgene safety is a comprehensive, well defined, communicated and enforced management system. The role of company and plant leadership in reinforcing the safety culture cannot be overstated.

1.1 Compliance with regulations

The plant must comply with all local and national regulations. Company standards are normally followed if they are more stringent.

1.2 Planning

In alignment with good operating practice, plans for plant design, operation and operator training should be clearly specified and communicated, preferably in written form.

1.3 Adherence to procedures

Safe operation is ensured by adherence to procedures and rules that are audited, reviewed and updated on a regular basis.

1.4 Risk assessments / safety analyses and reviews

An important technique for ensuring plant safety is conducting risk assessment reviews for the plant design and all changes. Tools for executing risk assessments are Inherent Safety Review, Hazard and Operability Process (**HAZOP**), Quantitative Risk Assessment (**QRA**) or company specific methods.

1.5 Root Cause Investigation (RCI)

The objectives of the RCI process are

- Determine the causes of failures and successes
- Develop corrective actions to prevent the recurrence of failures and ensure the recurrence of successes

The following categories could lead to an RCI:

- Personal safety and health incidents / accidents
- Process safety incidents
- Unplanned plant outages
- Loss of primary containment, leaks and spills
- Potentially serious events (near misses/near incidents)
- Environmental incidents
- Blowing of process safety valves / rupture disks
- Reliability issues
- Frequent equipment failures (e.g. corrosion or mechanical failures)
- Security events
- Regulatory noncompliance

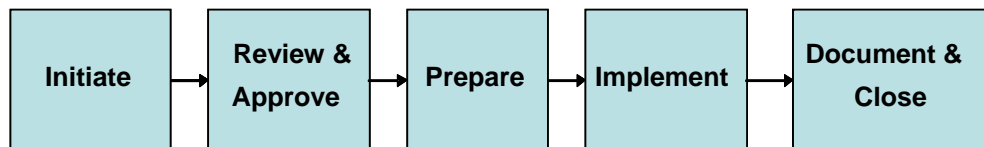
Investigation of incidents and accidents, even if minor, by knowledgeable experts with corrective action defined and implemented in a timely fashion is important to the continuous improvement of safety systems. RCIs are best conducted by knowledgeable personnel. Following a documented Management of Change (MOC) process is useful to review, authorize and validate the success of the proposed changes.

1.6 Management of Change (MOC)

Management of Change (MOC) is a process to review and approve all changes that are not like-for-like replacements before implementation, to ensure that:

- all changes have appropriate reviews and approvals
- documentation related to the change is created or updated and is accessible to pertinent personnel for use
- appropriate training is conducted and documented
- appropriate notification to relevant personnel is completed

The following is a high level view of the MOC process:



1.7 Emergency response plans

It is important to have an Emergency Response Plan for phosgene releases and personal exposure to phosgene. These plans typically include in-plant personnel, neighbouring plants and surrounding communities. Conducting regular drills is an effective way to check and maintain the effectiveness of these plans.

1.8 First aid and medical intervention

Advance planning, documented response protocols and training of medical response personnel ensure preparedness in the event of a phosgene exposure. See also Part 3 – Section 1 - First Aid, Medical Intervention and Emergency Response (in preparation).

1.9 Safety Strategy

There are two basic principles which are considered to be very important:

- The facility has established minimum managerial, procedural and technical requirements for the handling of phosgene
- Safety solutions may be different depending on the product, process or other special or local requirements.

Safety solutions employ a primary and secondary safety measures:

- **Primary Safety Measure** (prevention): Primary measures are the use of technical design requirements along with the organisational and training requirements established in this manual
- **Secondary Safety Measures** (mitigation): Secondary measures are equivalent mitigation solutions providing backup in case of failure of primary measures and may include:
 - A containment chamber with a caustic scrubber
 - Fully jacketed equipment and piping systems
 - The use of a steam-ammonia curtain
 - Combinations of 1, 2 and 3; or alternative mitigation systems.

(Abbreviations and Acronyms)

HAZOP	Hazard and Operability Study
QRA	Quantitative Risk Assessment
RCA	Root Cause Analysis
RCI	Root Cause Investigation