

Safety Bulletin

Pre-Startup Safety Review (PSSR)



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Introduction

The Pre-Startup Safety Review is a safety review conducted prior to startup of a new or modified process or facility to ensure that it is ready for the introduction of highly hazardous chemicals and prepared for safe operation moving forward.

A Pre Startup Safety Review covers not only equipment, but also procedures and training.¹

Who... is required to perform Pre-Startup Safety Reviews?²

- OSHA PSM covered processes
- EPA RMP Program 3 facilities
- Other State agency requirements (i.e. CalARP Program 3 and 4, Nevada Chemical Accident Prevention Program (CAPP))³
- Facilities storing and handling combustible dust and hazardous materials as required by the Fire Code

When... Shall a Pre Start-Up Safety Review be performed?²

1. New Installations: Whenever a new facility, process, or system is constructed or installed, a PSSR is often required to ensure that all equipment is installed correctly and that safety measures are in place.
2. Major Modifications: If there are significant changes or modifications made to an existing process, system, or facility that could impact safety, a PSSR is necessary to verify that the changes have been implemented safely.
3. Restart After Shutdown: A PSSR may be required to ensure that all systems and equipment are operational and safe before restarting production.
4. Change of Ownership: When ownership of a facility or process changes, the new owner may need to conduct a PSSR to verify the safety of the operation.
5. Change in Operating Conditions: Any significant change in operating conditions, such as changes in temperature, pressure, or chemicals used, may trigger the need for a PSSR.
6. Safety Incidents or Accidents: If there have been safety incidents, accidents, or near-misses, a PSSR may be required before operations can resume to address any safety concerns.

In This Issue

This Safety Bulletin provides an overview of the Pre-Startup Safety Review (PSSR) process and associated requirements.

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<https://www.NebulaSafety.com>

Often times a PSSR is triggered following any updates made to a covered process which impacts any aspect of Process Safety Information (PSI) prior to startup.

Process Safety Information (PSI)

OSHA provides the following description of PSI in 29 CFR 1910.119(d):

“...include[s] information pertaining to the hazards of the highly hazardous chemicals used or produced by the process, information pertaining to the technology of the process, and information pertaining to the equipment in the process.”

Process Safety Information by Category ⁴		
Chemical Hazards Information	Technology Information	Process Equipment Information
<ul style="list-style-type: none"> • Toxicity information • Exposure limits • Physical data • Reactivity data • Corrosivity data • Thermal and chemical stability data • Inadvertent mixing concerns 	<ul style="list-style-type: none"> • Block flow of Process Flow Diagram • Process Chemistry • Maximum Intended Inventory • Safe Upper and Lower Limits (Temperature/Pressure/Flow/etc.) • Evaluation of the Consequences of Deviation from Design 	<ul style="list-style-type: none"> • Materials of Construction • Piping and Instrumentation Diagrams (P&IDs) • Electrical Classifications • Relief System Design • Ventilation Design • Codes and Standards Employed • Materials and Energy Balances • Safety Systems • Documentation of RAGAGEP Compliance

What... must be addressed during the PSSR²

The following shall be confirmed as part of the PSSR, prior to start-up or introduction of hazardous chemicals:

- Equipment was installed correctly and matches design specifications, and safety systems are verified functional
- Adequate safety, operating, maintenance and emergency procedures are in place
- For new covered processes, a process hazard analysis has been performed and recommendations have been resolved
- For updates to existing processes, all requirements of the management of change process have been met and hazards have been identified and mitigated appropriately
- Training of employees and contractors has occurred
- New equipment has been added to the maintenance plan and spare parts are available (as needed)
- Relevant documentation is up to date and accurate (redlines may be acceptable with follow-up actions for implementation)

Common PSSR Deficiencies

- Lack of written procedures for performing a PSSR
- Incomplete or unretained PSSR documentation
- Failure to complete documentation with sign-off prior to startup
- Inadequate training

Incident

BP Texas City – 2005

During Startup of the ISOM unit, the raffinate tower was overfilled with flammable hydrocarbons. Upon tower overfill, the liquid flowed to the blowdown drum, finally releasing out the stack. The liquid released began to pool and form a vapor cloud which exploded when the cloud reached a running vehicle. The explosion killed 15 individuals and injured a further 180 and led to a two year shutdown of the unit.

According to the USCSB investigation, numerous factors contributed to the 2005 BP Texas City explosion including instrumentation and procedural failures. One noted factor was a failure to perform a PSSR in line with facility policy.

Though BP Texas City had an adequate PSSR program in place, a PSSR was not performed for startup of the ISOM unit as personnel were not aware of the PSSR program's applicability to the ISOM unit start-up. Had the PSSR been performed, a formal safety review including a review of the ISOM unit startup procedure and related PSI would have been conducted. This might have identified the level valve misalignment or may have identified the faulty redundant high level alarm, and the incident may have been avoided. Furthermore, the BP PSSR procedure requires removing all non-essential workers from the unit and nearby units prior to startup, which had it been followed, would have helped to limit the personnel impact of the incident.³



Figure 1: Aerial View of Damaged Buildings Caused by the Explosion³

References:

1. <https://instrumentationtools.com/pre-startup-safety-review-pssr/>
2. <https://www.aiche.org/resources/publications/cep/2022/june/conduct-effective-pre-startup-safety-review>
3. <https://www.csb.gov/bp-america-texas-city-refinery-explosion/>
4. <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.119>
5. <https://www.rmpcorp.com/rmppsm-series/>