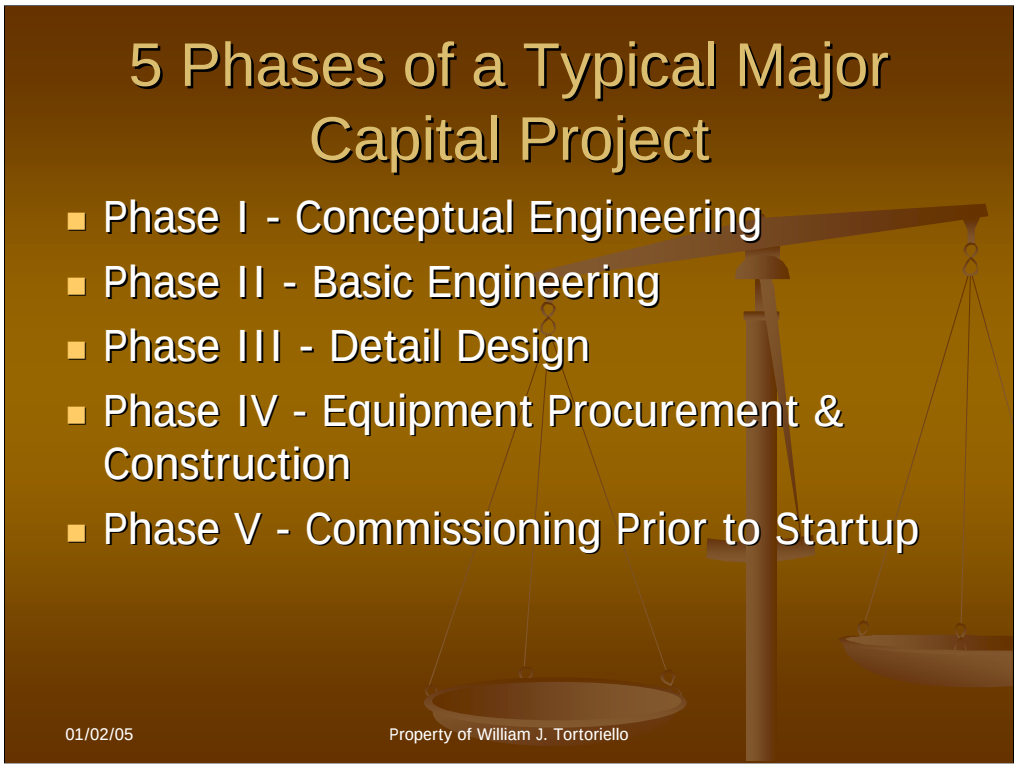
This module is intended to provide a basic understanding of PSM, and to continue to improve general PSM awareness.

If you have any questions regarding this module or the PSM course in general, please contact the instructor.

This module provides an overview of how Pre-Startup Safety Reviews (PSSRs) are managed for new and modified facilities.

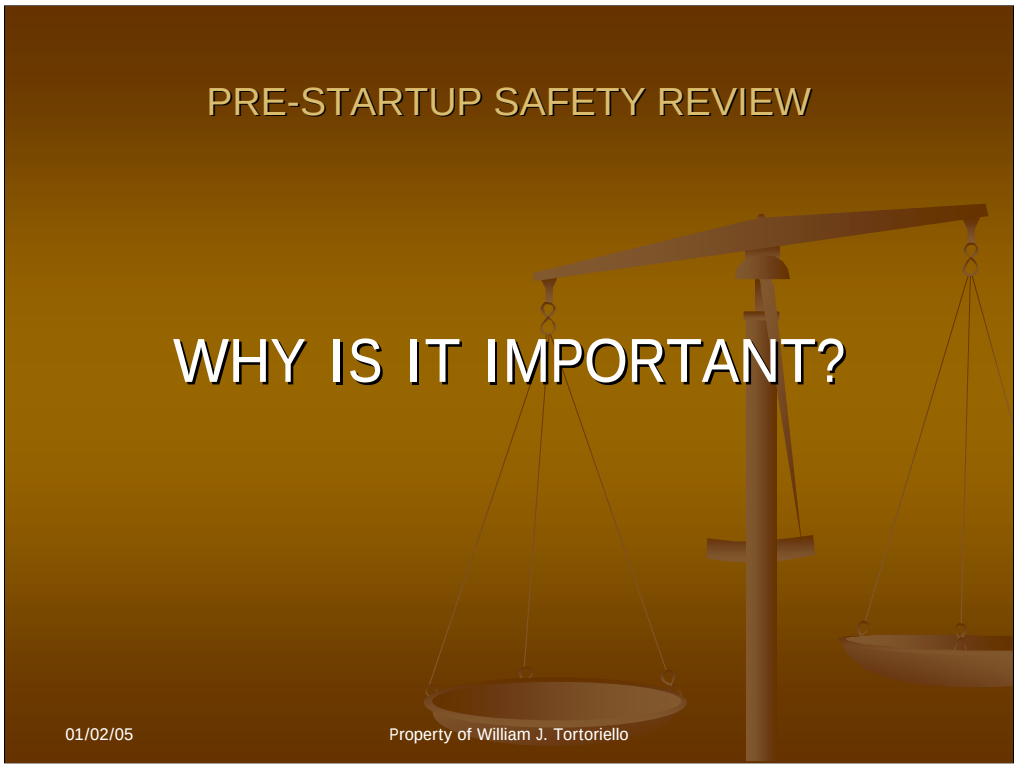


On any capital project a BOD (Basis of Design) is developed in Phase I. Basic engineering is based on the BOD. This is why it is essential that all the stakeholders be involve in Phase I. Otherwise there will be a lot of disputes later as to what is needed. There will be surprises at the end that will be very costly to correct and sometimes compromises to safety in the interest of meeting budget and timing constraints. All of this is avoidable from the beginning by developing a correct BOD.

A Pre-Start-up Safety Review is the final, formal check to confirm that nothing has been overlooked.

As an example, several new storage tanks were installed near a factory to support manufacturing. Before putting these tanks into service, a number of items should be verified. For example, have interlocks been tested? Have operating procedures been developed and approved? Have operating personnel been trained?

Management of Change, flagged that these things need to be done, and the PSSR verifies that they were prior to startup.



Production and support operations can involve flammable, toxic and corrosive materials, as well as other physical hazards. We can't afford to start-up such systems without thoroughly verifying that all of the safety bases have been covered.

For the storage tank example, the failure of any of the activities verified in a PSSR could lead to a fire or explosion or a major release and corresponding potential personnel injury, property damage or business interruption.

Many incidents have occurred around the world that reinforce the importance of PSSRs. For example, an error was discovered that involved safety relief valves which were installed in transfer piping from bulk storage tanks to a manufacturing factory. The discharge piping for the safety relief valves was crossed and routed back to the wrong tanks. This incident fortunately did not have any safety consequence, but had significant potential quality impacts. This incident reinforced the importance of thorough field verification of drawings for new installations.

Process Safety Review for Capital Projects

New projects can introduce:

- New equipment
- New chemistries
- State-of-the-art controls
- New operating procedures
- increased chemical inventories
- New hazards

Refer to text for details on these components.

Manufacturing steps are covered by OSHA's PSM regulation.Company PSM Standard call for the same PSSR requirements for all chemical manufacturing processes.

PSSRs must be conducted for all new and modified facilities, and must confirm that several primary safety bases have been covered. Verification that the installation agrees with the design is typically accomplished via field verification of design drawings and specifications. This confirms that piping has been installed per the design drawings, and that specified equipment was correctly purchased and installed.

For the tank farm example, this includes checking name plates to verify vessels have the correct maximum allowable working pressure, and the emergency vents are the correct size and set at the right relief pressure.

PSSRs must also confirm that operating procedures have been developed or modified as necessary.

HAZOP action items should have dates that correspond with whether their completion before startup is critical. Similarly, completion of all startup-critical action items from safety assessments of modifications must be confirmed.

Any required training must be confirmed. For our tank farm example, the materials management personnel that unload tank trucks into these tanks will need to have been trained, as well as the factory personnel that make transfers from these tanks. Training of maintenance personnel may also be required , for example, if equipment new to the site is introduced.

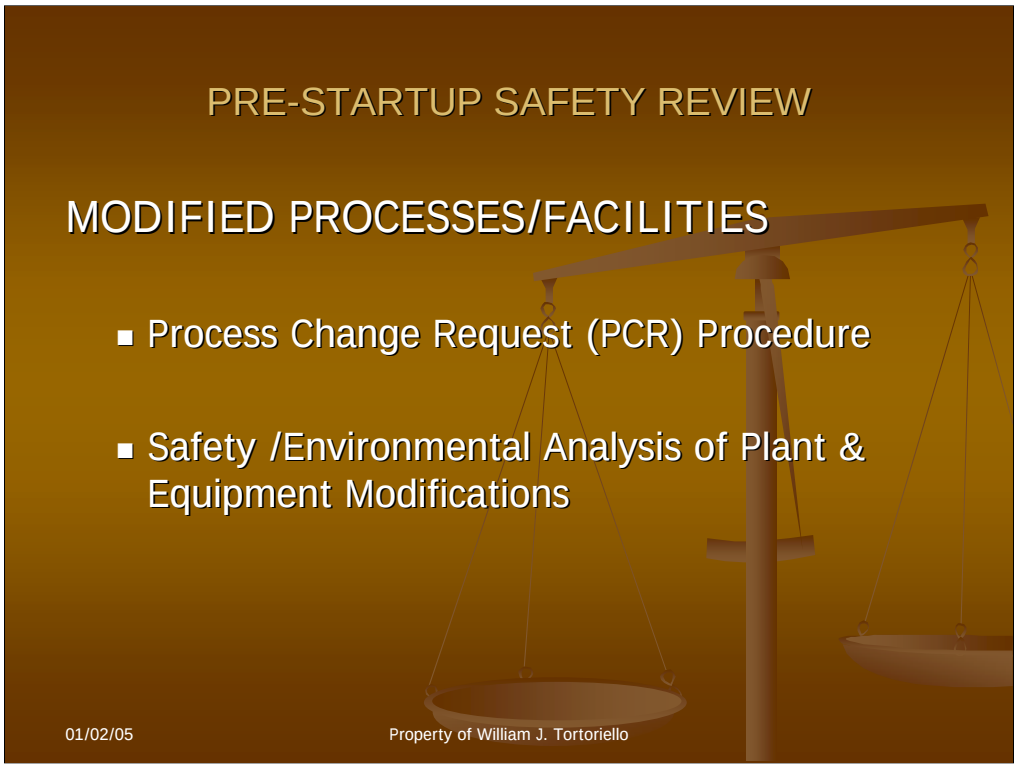
The types of changes to manufacturing and support operations can fall into three main categories. Campaigned process setup is essentially a modified facility case that is uniquely handled.

Each of these is covered in further detail on the next couple of slides.

For capital installation of new facilities, a site Safety Procedure should be developed and used. The main part of this Safety Procedure should be in the form of a checklist. This checklist confirms that all necessary documentation has been received or properly updated, and includes several pages of field verification items, such as guarding, grounding, labeling, etc.. The field verification is performed by a team of people that include representatives from Operations, Engineering, Safety, Maintenance, and any other appropriate support groups. A punch list of corrective actions is developed, and the actions that must be completed before startup are identified.

New equipment that impacts product quality undergoes an Installation Qualification and an Operational Qualification. The Installation Qualification is a documented verification that the equipment was purchased and installed as specified. This involves field-verifying drawings and checking nameplate information against design specifications, as previously discussed..

Operational qualification involves the performance of basic checks to confirm the equipment is operational. For the tank farm example, this would include running the pumps to verify that they are operational and testing any safety interlocks, such as a high and low level interlocks that shut off pumps.



The Process Change Request Procedure (PCR) is used to document review and approval of changes that impact product quality. This procedure is discussed in Management of Change. The PCR author is responsible for addressing all action items prior to implementation.

The Technical Operations Department should manage this procedure and tracks all PCRs.

There should be a site Safety Procedure which covers equipment changes. Beyond the review and approval sections of the procedure, the checklist package includes a sign-off by the area representative that all of the required activities have been completed. A database of all safety assessments is also maintained to help insure that all assessments are closed out.

Processes that are campaigned also need to go through a PSSR as the associated equipment is typically modified during set-up. The most common changes include installation or movement of blanks, new or different connections to solvent supply manifolds, and adjustment of process controller and interlock setpoints.

Verification of these modifications, along with the other PSSR requirements, can be captured by a document titled the Campaign Coordinator's Checklist. This checklist includes a detailed listing of the various actions that must be completed and verified during set-up. Each item is initialed by the responsible engineer, and the completed checklist is also reviewed and signed by their manager.

Additionally, a water and/or solvent dummy run is normally conducted prior to the start of actual operation to check out the system.

The proper review of changes to manufacturing and support operations is critical to their continued safe operation. Improper changes could cause serious injury, environmental excursions, or costly business interruption/impact.

There can be formal PSSR procedures including a Project Acceptance Procedure, a Safety & Environmental Checklist), the Process Change Request procedure, and the Campaign Coordinator's Checklist.

All employees involved in manufacturing and support operations can help by ensuring that all changes receive the proper safety review prior to startup.