

Continuous PHA Revalidation

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Summary

Operating companies covered by OSHA's Process Safety Management (PSM) standard or EPA's Risk Management Program (RMP) rule are required to revalidate their Process Hazard Analysis (PHA) every five years. Very frequently, process hazard analysis (PHA) teams encounter frustrating challenges, including:

- ◆ Identification of a hazard introduced by a process change
- ◆ Identification of a hazard similar to a recent incident that was either overlooked in the previous PHA or deemed to have adequate protection
- ◆ Inadequate documentation from the previous PHA



Clearly, PHA revalidation is an essential and critical activity.

However, *how* and *when* it is performed determines if it will be effective in preventing incidents.

This paper discusses the merits of a new approach geared towards increasing the effectiveness of PHAs. Called *Continuous PHA Revalidation*, the new approach may be summarized by asking a simple question:

Why not revalidate your existing PHA every time a change is made or every time an incident investigation is completed?

The Old Way

As the industry has learned the hard way, PHA revalidation every five years has proved to be much more challenging than originally perceived. At a minimum, the following information is required in order to revalidate an existing PHA:

- ◆ The previous PHA worksheets
- ◆ The piping and instrumentation diagrams (P&IDs) used to conduct the previous PHA with study-sections clearly highlighted
- ◆ Resolution of each recommendation from the previous PHA
- ◆ Copies of each process change (and pre-startup safety review (PSSR) if applicable) since the

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previous PHA was completed and resolution of each action item

- ◆ Copies of each incident since the previous PHA and resolution of each action item
- ◆ A set of current P&IDs

A typical revalidation effort focuses on the same study-sections as defined in the previous PHA and updates them accordingly using the following general process:

- ◆ Determine if the study-section has been subject to any process / field changes.
- ◆ Modify the applicable hazard scenarios to reflect the change, referencing the relevant Management of Change (MOC) item and/or Incident Investigation report. This would entail the addition of new scenarios or the deletion of scenarios that are no longer applicable.
- ◆ Review action items associated with recommendations from previous PHAs. If the action items provide additional protection against the identified hazard, they should be documented as new controls. If they serve to reduce the potential consequences, the potential consequences must be revised accordingly.
- ◆ Review and update risk ranking to reflect changes to the frequency or consequence of the mitigated scenarios. Verify that the current risk rank is tolerable.
- ◆ Incorporate documentation from any PHAs conducted as part of a MOC or incident investigation.

The approach outlined above, which is followed by most of the process industry, has a serious shortfall. It essentially waits for the five-year revalidation period to identify process changes that may have introduced new hazards or for that matter to confirm whether recommendations proposed in the previous PHA have been addressed and have mitigated risk to a tolerable level. In either case, there is an inherent risk of a hazardous incident between the two PHAs.

The solution to this problem lies in *continuous PHA revalidation*.

What Is Continuous PHA Revalidation?

Continuous PHA Revalidation requires an operating facility to treat its PHA program as an evergreen document, rather than one requiring update every five years. In practical terms, Continuous PHA Revalidation would:

- ◆ Require the existing PHA be updated as recommended changes are implemented
- ◆ Require the existing PHA be updated after each incident

Clearly, it is much simpler to update a PHA after each change as the individuals responsible for conducting the PHA and executing assigned action items are easily accessible. After five years, several people involved in the PHA may not be available and the PHA team has to rely on second-hand information.

Continuous PHA Revalidation requires that a PHA team be assembled on short notice to update the PHA for changes made to a process. This may sound like a lot of work, but most changes do not have a significant impact on an existing PHA. It is recommended that sites employ a

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screening process to determine if changes to the existing PHA are necessary as this will eventually aid in expediting the process.

If the change does require an update of the PHA, it entails the simple task of reviewing the study-sections and documenting any recommendations. Since most operating companies have implemented electronic PHA and process safety information (PSI) management solutions, updating existing PHAs is convenient. Some companies have taken electronic systems a step further with web-based platforms that greatly enhance information accessibility at all levels, thereby making it even easier for the PHA team members to update information.

As briefly discussed above, the concept of Continuous PHA Revalidation is simple. It is envisioned that very soon many operating companies will adopt this model of PHA revalidation.

Example

An operating company used a tank farm to store flammable liquid raw material. One of the tanks containing a highly reactive material was protected by a pressure safety valve (PSV) set at the tank maximum allowable working pressure (MAWP) of 100 psig. The previous PHA identified the plugging of the PSV inlet as a potential concern. This concern was substantiated by the PSV's annual inspection reports that verified plugging.

The PHA team recommended the installation of a rupture disc upstream of the PSV. An MOC item was initiated and the rupture disc was installed.

A month later an overpressure event (triggered by contamination) caused the tank pressure to reach 180 psig before the rupture disc blew and vented the tank contents. The ensuing Incident Investigation revealed that the rupture disc had developed a pinhole leak and the space between the rupture disc and PSV had pressurized to the normal tank pressure of 80 psig. The MOC review had not identified the need for a telltale between the rupture disc and relief valve. The Incident Investigation generated a recommendation to install a telltale.

Following this, another MOC was initiated to address the telltale installation. However, four years later during a PHA, the PHA team discovered that the telltale was located such that it could not be read from ground level and was therefore never monitored.

The PHA team issued another recommendation to relocate the telltale to enable readings from ground level. Additionally, the team recommended a weekly inspection to verify that pressure was not building up in the space between the rupture disc and relief valve.

This example illustrates a common scenario that occurs when operating facilities implement a change with the intent to make the process safer; the recommended action inadvertently introduces a new hazard to the facility. It is therefore imperative to review each change with the same rigor as a PHA.

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Most importantly, *do not wait for five years to expose hazards you can identify today.*

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