



## **Don't Put Your Report on a Shelf!**

**How can I use the PHA report?**

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### **Abstract**

The Process Hazard Analysis (PHA) report is a gold mine of information. It can be used to enhance areas in a plant, such as training programs and procedures. When utilized fully, it can help identify critical areas for mechanical integrity programs, assist with updating Process Safety Information (PSI), and provide information for Management of Change and emergency response plans.

With a quality PHA in place, the resulting integration of the PHA into a site's Process Safety Management (PSM) program has positive ripple effects, improving the quality and effectiveness of other PSM elements such as Procedure Development, PSI, and Mechanical Integrity (MI).

Guidelines are provided for the following:

- Identifying elements for other departments (e.g., MI)
- Procedure development/enhancement
- How to use information for training and emergency response
- Updating PSI
- How to set up your PHA to enable easier information transfer

This presentation identifies ways to use the information from your PHA to improve your PSM program.

## **1 Introduction**

As stated in the abstract, the PHA report is a gold mine of information that, when used deliberately, can enhance many PSM elements in a plant. With a quality PHA completed, one can use it to data mine for the site mechanical integrity program, training and operating procedures. It can be utilized to update PSI and provide information for Management of Change and even upgrade emergency response plans.

When utilizing a quality PHA into a site's PSM program, there are many positive ripple effects.

The following guidelines are provided:

- Identifying information for other elements
- Procedure development/enhancement
- How to use information for training and emergency response
- Updating PSI
- How to set up your PHA to enable easier information transfer

This presentation identifies ways to use the information from your PHA to improve your PSM program.

## **2.0 Benefits of Utilizing the PHA Report**

A PHA is a gathering place for Process Safety Information and its impact on recognized causes, consequences, and safeguards. The mapping of cause/consequence pairings that were developed by an experienced team provides detailed information that can be utilized in many areas of your PSM program, such as MI, training, and emergency response.

### **Mechanical Integrity (MI)**

Asset integrity programs can be enhanced utilizing the information from a PHA, particularly if a full Asset Integrity study has not been completed. Having cause/consequence pairings coupled with the risk rankings, critical equipment can be identified based on either severity and/or likelihood of failure.

During a PHA, several specialists, such as inspectors, and rotating equipment and instrumentation and electrical (I&E) specialists, are often called in to identify areas of concern for them. This information is then available to the team during the PHA, helping them to fully identify issues that may have been misunderstood or not clearly or fully addressed previously.

An example of this: The inspector had indicated to the team that piping made of a certain material was more prone to corrosion at high temperatures. During the PHA, the operator on the team identified that they had had several instances of overfilling a vessel, sending hot material into the overhead piping. Upon further review, it was discovered that the piping was the material of concern. When brought to the attention of the inspector, he had not identified this section of piping as a concern, because it was not supposed to have hot material in it. Further review showed that there were, in fact, multiple instances of overfill. The piping was added to the MI program as requiring increased inspections.

Another example of the interplay with MI program is understanding the impact of concerns for maintenance personnel. During a PHA, the head of maintenance requested to be included in the PHA because he had several concerns around a series of compressors. His concern was that the operations personnel did not fully comprehend the hazards associated with that particular series of equipment. During the PHA, the operations personnel ranked the hazard fairly low. However, the

maintenance manager argued that it was far higher because he often had a team of 3 personnel in the area. His argument was that if one compressor were to have a fire, all of the compressors would be in jeopardy of fire with the potential of explosion while his personnel were in the area. This concern was raised to management due to the severity of the ranking, and further precautions were added to ensure the safety of maintenance personnel while working on this equipment.

### **Procedure Development and Enhancement**

Having identified a clear path of the sequence of events, procedures can be developed or enhanced in the following areas:

1. Response to initiating event
2. Response to any of the intermediate events
3. Response to trips
4. Response to emergency events

Occasionally, it is necessary to identify a procedure as a critical procedure during a PHA. When this is done, it is important for the team to review the procedure to determine if it calls out a hazard with the appropriate alarm, equipment reaction/function, and the operator response. If not, the team may determine that a procedure needs to be updated or developed to properly address the hazard in question.

Some sites have opted to conduct an Alarm Objective Analysis (AoA). While this is being completed, it is important to have access to the PHA in order to align the two. If not, one or the other, may remove an alarm that another team may have considered important. Conversely, they may add one that the other team deemed unimportant. This can then lead to confusion.

For example: in a PHA an operator called out an alarm as critical. Another operator said it was no longer operational. After calling the board operator to verify, it was found that the alarm had been disabled during the recent AoA. Both operators said that it was one that they relied on heavily and that neither of them had participated in an AoA.

### **Using PHA Information for Training and Emergency response**

The cause/consequence pairing from a PHA provides an initiating event, the intermediate and final outcomes. From that information you can:

1. Develop or enhance training on potential risks in the plant
2. Develop simulation training for high risk scenarios

During initial and refresher operator training, personnel are trained to watch for events out of the ordinary. Therefore, as a PHA correctly identifies the cause/consequence pairing, the operator is provided with information about the initiating, interim, and final events and the appropriate safeguards to eliminate or minimize the hazards. Additionally, if the safeguards are identified in order of when or where they will activate in relation to the cause/consequence scenario, the operator can see, not only the importance of the different safeguards, but their relationships to the events.

Training can be developed for how to respond to an alarm at any point in the sequence. It is important to note, however, that depending on the site PHA program, the alarm may or may not

be credited. This then can impact whether there is an identified action for that specific alarm. Training may be provided on how to troubleshoot and guidelines given.

If the severity is high enough, sites can (and have) created simulations for response to high risk scenarios. With the recent attrition rate at many locations, simulations are becoming highly valued tools to provide the information necessary on how to respond to dangerous circumstances. These scenarios can be culled from the PHA.

Another area that can be impacted is emergency response. For example: during a PHA, it was identified that there was a tote of material that if exposed to heat, could lead to the production of a highly lethal gas. When asked if the emergency response team was aware of this, it was discovered that they were not. The tote was situated near a furnace and sealed. However, the concern was that in the case of a fire, the tote may rupture leading to exposure for emergency personnel. The team was able to provide a recommendation to ensure that this information was passed to appropriate personnel and addressed, as necessary.

### **Safeguards**

Independent Protection Layer (IPL) management is a key concept that stems from conducting a Layer of Protection Analysis (LOPA). However, many sites are utilizing the same or similar rigor for Safeguard management after completing a PHA.

Thus, a key area that a PHA can benefit a site is in the identification of the critical safeguards. Once a PHA is completed, information about the safeguards can and should be passed on to the appropriate parties for proper maintenance thus ensuring that repair of the item is appropriately categorized.

Another benefit for safeguards is that once identified, *IF* you have to take something out of service for maintenance, an alarm for example, you can see what the impact will be and whether or not you have enough safeguards still in place.

### **Updating PSI**

While the PHA is not meant to be a place to find and correct PSI, because it is a team activity that requires an in-depth review of various pieces of information, it can often become a way to identify and correct PSI. Common areas to find errors, include the P&IDs and PFDs, tag numbers matching P&IDs, board and I&E CODs, procedure numbers, operator action for alarms, other equipment identifiers.

Often procedures are called out during a PHA. Upon further scrutiny, it is determined that the scenario is not clearly identified within the procedure, or that there are no clear actions to prevent or mitigate the scenario.

### **Project PHAs**

A PHA is more than just a “check the box” activity for Project Managers. It is an important first

step to identify cause/consequence pairings and associated safeguards for the project. Project managers can use the Project PHA to:

1. Assist in understanding the hazards associated with the area/change in question.
2. Understand the safeguards associated with the current situation in order to understand what, if any, changes need to occur with the proposed changes.
3. Helps the site determine potential additional hazards outside the scope of the project (i.e., Upstream and downstream)

The Project PHA can be utilized to flesh out additional training required for new operations and identify items that need to be added to other programs.

A Procedural PHA can be used to flesh out steps for new operations procedures. A procedural PHA is a specialized PHA designed specifically to identify concerns that surround a procedure. They can be conducted as part of the process PHA or separately.

The Project PHA can also be utilized when completing an AOA.

Project PHAs can first be done as a What If during concept stage and then be modified at various stages of design, thus maintaining an accurate picture of the potential hazards being introduced by the changes.

### **3.0 How to set up your PHA to enable easier information transfer**

It is useful to know what data you would like to pull from a PHA after it is complete. Custom reports can be created in some software that allow you to export information as a Word document, excel spreadsheet or .csv file if you plan. However, if you did not plan, or you are utilizing software or a template that cannot be modified, you may need to manually pull the data. While time consuming, it is still valuable.

Additionally, if a database is being created to determine criticality of certain safeguards and/or equipment based on its use in the PHA, they can be written such that the information is already in a format that can be transferred easily into the appropriate databases in which they will be utilized.

For example:

- Interlocks can be written to include the set points, valves that are required to open or close and the scenario that it is protecting.
- Alarms can be written to clearly identify what is triggered and what is protected.

This information may be utilized to determine priority for maintenance, for example.

### **4.0 Conclusion**

There are a variety of ways that a high quality PHA can be utilized to augment other areas of your PSM program after it has been completed. Data mining, while time consuming, can yield valuable information to enhance Training programs, update Procedures, and Emergency Response Plans, support Mechanical Integrity programs, and update Process Safety Information.

Setting up your expectations in advance allows you to establish requirements for modification to the PHA template (if possible) such that data can be exported easily. If not, you can create expectations about how the scenarios, safeguards and recommendations will be written to facilitate the identification and subsequent transfer of data for the other elements within the PSM program.

