Questions received during the live webinar session held on 16th September 2020

1. For gas explosion inside, PHA recommendation is to upgrade design pressure to move to acceptable risk from intermediate risk based on burst risk. But it is not possible to upgrade design pressure. What is possible solution to move to acceptable risk ?

   In deflagration cases, risks can be reduced in an alternative way but equally safer alternative. Consider explosion panel venting or NFPA 68. If it is not feasible then consider other layer of protection as part of PHA study.

2. Practically the system may not operate at Auto ignition temperature, if it is at auto ignition temperature there will be a fire or explosion irrespective of other conditions?

   Many of the operating units if they are required to operate at auto ignition temperature, there are many protective devices, which ensures that it doesn't enter the flammability zone through the auto ignition temperature. Many monitoring techniques can be used.

3. If one storage tank is shifted to safer place then QRA need to be done though can we use damage distance of previous QRA?

   Yes, if only the geographic location is changing and the same equipment is shifted, we can use same damage distances. However, the impact/ exposure group of people or assets nearby could vary. Risks due to vulnerability of new facilities due to hazards of the adjacent facilities could vary.

4. Is PSSR a type of PHA? (PSSR- pre start safety review)

   Not really, PSSR is a systematic and thorough check of a process prior to the introduction of a highly hazardous chemical to a process. The PSSR must confirm the following: Construction and equipment are in accordance with design specifications; Safety, operating, maintenance, and emergency procedures are in place and are adequate; A process hazard analysis has been performed for new facilities and recommendations have been resolved or implemented before startup, and modified facilities meet the management of change requirements; and training of each employee involved in operating a process has been completed..

5. What is basic difference between Probabilistic Safety Assessment (PSA) and QRA?

   QRA is quantifying both consequences and the frequencies and also observes other factors persons being present or not, for example, ignition being there or not. QRA computes total consequence in a quantitative basis. Example: if there is a fire how far can the thermal radiation go and how many fatalities could occur, so the end result of the QRA is basically in terms of fatalities per year. So that

may not be the case in the PSA studies where people could take a qualitative or semi-quantitative approach also.

6. What is the acceptable Risk in Indian Scenario?

   If we look into the tolerable risk limits, they are not commonly spelt out for all the hazardous facilities as yet. Tolerable frequency is mostly company specific.

7. How to prevent runaway reaction by proper PHA implementation?

   Reactive Hazard Analysis (RHA) can be performed on top of PHA. Standard guidewords in PHA can provide basic evaluation of runaway reaction scenarios in a system. RHA can provide the detailed evaluation of reactive hazards associated with normal operating conditions and for all foreseeable abnormal conditions.

8. What's difference between PHA and HAZOP?

   HAZOP is though the popular step of PHA, that is part of the hazard evaluation studies to build scenarios and recognize the process safety risks but when its PHA broadly we look into many other aspects like doing chemical-chemical interaction, or looking into human factor analysis, consequence analysis and so on. These steps are add-ons to supplement over and above the HAZOP. So, to summarize HAZOP is subset or part of the whole PHA.

9. Is LOPA and SIL are same?

   LOPA is the technique which is helping us to quantify the frequency part of the risk, helps to determine the safe level. SIL is a level of integrity or safety a particular system should be designed to able to uphold as a safety integrated system. SIL is a level assigned to SIS, LOPA is technique to determine SIL.

10. What are the benefits of conducting HAZOP over other PHA- Qualitative?

    HAZOP gives a structured approach with pre-defined deviations, like the guide words, parameters like temperature and pressure. Example: If the process is new with no prior experience with the team involved, HAZOP will ensure the necessary or the basic scenarios are brainstormed. If we have other technique like What if analysis, due to limited understanding of the process the teams may not get right scenarios based on only brainstorming.

11. If the working approach of a human is very casual, then is it still valid line that "TRY TO CHANGE SITUATION, NOT PEOPLE"?

    Process Safety Culture is very important, the culture is everyone’s responsibilities from top to bottom or bottom to top. A strong organization culture towards safety is part of operation integrity and is on top of your process safety management program

12. QRA once conducted is valid for how many years?

    No specific frequency is recommended. A QRA done at a project stage can be valid, till you don’t have a major change either to the facility or process unit or you don’t have any changes to the people in the vicinity or community till that time its valid.

The moment there are changes to either of these cases, then we need to go into re-validation.

13. What is the frequency of conducting PHA as per national safety codes? How to evaluate PHA in safety audit? What key areas should be focused which indicate high quality of PHA?

    OSHA recommends for every 5 years the PHA needs to be revalidated unless there is any change in the process, design etc. Quality of PHA can be determined by an experienced Process Safety Expert.

14. Difference between HAZOP and HAZID?

    HAZOP is a systematic qualitative technique to identify process hazards and potential operating problems using a series of guide words to study process deviations, performed based on P&IDs. A HAZOP is used to question every part of a process to discover what deviations from the intention of the design can occur and what their causes and consequences may be. This is done systematically by applying suitable guidewords. This is a systematic detailed review technique, for both batch and continuous plants, which can be applied to new or existing processes to identify hazards. Whereas hazard identification (HazID) study is a method for identifying hazards in order to prevent and reduce any adverse impact that could cause injury to personnel, damage or loss of property, environment and production, or become a liability. HazID is a component of risk assessment and management in early stages of the project when limited information is available.

15. Can u explain relation between SIS, SIL, SIF?

    A safety instrumented system (SIS) consists of an engineered set of hardware and software controls which are especially used on critical process systems. A combination of SIF like sensing elements, solver, and final elements for the SIS. Safety integrity level (SIL) is defined as a relative level of risk-reduction provided by a safety function, or to specify a target level of risk reduction. SIF is a Safety Instrumented Function which performs a specific set of actions for a given logic.

16. What are the benefits of SIL?

    SIL is a quantitative target level risk reduction.