

Some qualitative tools and techniques for safety analysis of hazardous plant

HAZID is a brainstorming technique using personnel with a variety of backgrounds and experience to identify and provide initial scoping of hazards present within an operation or process, and facilitated by an independent chair, based upon a hazard checklist (e.g. derived from ISO 17776:2000(E) for offshore platforms).

A Hazards and Effects Register contains the following information:

1. hazards and their sources;
2. threats (causes which could release the hazard and bring about the top event);
3. the top event (unwanted accident) which takes place when the hazard is released;
4. consequences (effects) which could occur if the top event is allowed to escalate unchecked;
5. the risk potential of the hazard; and
6. the means by which the hazard is controlled, either by preventing its release or limiting its effects.

The risk potential of the hazard is rated against the effects on Personnel (P), Assets (A), Environment (E) and Reputation (R).

Escape Evacuation and Rescue Analysis (EERA) is used in particular for oil platforms to review whether Escape, Evacuation and Rescue are adversely affected by the Major Accident Hazards, e.g. two independent escape routes should normally be available from all areas of the platform. (This can include quantitative assessments for, e.g., smoke fire and explosion.)

Essential Systems Survivability Analysis (ESSA) is used to

- Identify safety critical systems
- Define the functional requirements and HSE critical element goals for each system;
- Identify the Major Accident Hazard (MAH) events which could potentially stop the emergency systems functioning as required; and
- Evaluate each system with respect to its survivability from the Major Accident Hazards (MAHs) (which may involve some quantitative analysis).



A HAZOP study brings together the combined experiences of the study team stimulating each other and building upon each others ideas in a systematic way. Using a process flow diagram, which is examined in small sections, a design *Intention* is specified. The HAZOP team then determines what are the possible significant *Deviations* from each intention, feasible *Causes* and likely *Consequences*. It can then be decided whether existing, designed safeguards are sufficient, or whether additional actions are necessary to reduce risk to an acceptable level.