HAZARD AND OPERABILITY STUDY

The Hazard and Operability (*HAZOP*) study technique is one of a number of techniques which may be used to undertake safety reviews. HAZOP is a widely recognised and well established method that is used as a technique for hazard identification in a wide range of industries, including process chemicals, oil and gas and nuclear.

The HAZOP method identifies hazards and problems which may arise and prevent safe and efficient operation. It can and should be applied to all parts of the plant as it is important that all the hazards and operability problems associated with the plant should be known.

HAZOP General Methodology

The HAZOP technique was originally developed for the chemical process industry. The aim is to undertake a simple, systematic, yet comprehensive examination of plant designs to identify potential hazard and operability problems.

The technique requires a systematic examination of the plant design. This is achieved by having a multi-disciplinary team examine the plant design documentation, some of which are listed below:

- Process flow sheets.
- Engineering Process and Instrument Diagrams (*P&ID*).
- Plant layout drawings.
- Procedural documentation.

The information examined is dependent on the level of the HAZOP study and stage of design development.

The systematic process of hazard identification is carried out by applying **Keywords** or **Deviations** (derived from **Guidewords** and **Parameters**) in turn to sub-systems (or nodes) within the whole plant process.

The keywords and deviations enable the team to discuss and question possible hazards and operability problems associated with each operation or stage. Potential problems that are neither recognised nor overcome by present design and procedures can then be identified.

Recommendations are made for changes to the design or procedures to eliminate or minimise the identified problem. (Note that a HAZOP Level 1 study uses a set of keywords, whereas a study at the HAZOP Level 2 study uses deviations derived by combining parameters and guidewords).

HAZOPs thus provide a method for individuals in a team to visualise ways in which a plant or process can malfunction or maloperate. This creative thinking has to be guided and stimulated in a systematic fashion to cover all parts of the plant and all imaginable malfunctions and maloperations. In this way the probability of missing hazards or operating problems is reduced.

The HAZOP technique may be applied at different levels of examination from the conceptual or high level examination stage (HAZOP Level 1) to the detailed design examination stage (HAZOP Level 2) and may also be applied to an operational plant.

Additional Information & Guidance

- http://www.hse.gov.uk/comah/sragtech/techmeasplantmod.htm
- HAZOP and HAZAN - Identifying and Assessing Process Industry Hazards. Third Edition. The Institute of Chemical Engineers, T A Kletz, 1992.
- HAZOP: Guide to Best Practice, Guidelines to Best Practice for the Process and Chemical Industries, Third Edition, 2015.
- https://www-pub.iaea.org › MTCD › Publications