

HazOP- Hazard and operability study



Accident in Brazil with explosion due to natural gas leak on platform P-36.

11 dead and sinking of the platform.

Hazard and Operability Analysis, HazOp, is a structured qualitative analysis technique developed to identify operational problems in process plants, which, while apparently not presenting immediate hazards, may compromise the ability, productivity and / or plant safety, especially in situations where knowledge about the operation is scarce or inexistent, presents complexity in the process, application of new technologies.

HazOp consists of reviewing the engineering documents of the facility through meetings, during which a specialized working group performs an analysis of the hypotheses about the installation project in search of risks, following a pre-established structure.

To minimize the possibility that something is omitted, the analysis facilitator guides the group systematically about the P & D's, PFD's, unilateral electrical diagrams and / or mechanical arrangements of the project: line by line, for each study node analyzed are (absence of flow, temperature above the permissible range, key not triggered, etc.), its possible causes and analyzing the probable consequences in the occurrence two deviations. It is evidenced that the technique HazOp is a process to identify the operational deviations.

The HazOp method is mainly indicated in projects of new industrial installations and extensions of existing installations. HazOp is also suitable for analysis of modifications of existing facilities both large and small. Accidents can occur because one

underestimates or ignores the domino effect on the system due to minor modifications in it.

BRIEF HISTORICAL AND LEGAL REQUIREMENTS FOR RISK ANALYSIS IN PROCESS INDUSTRIES

- The HazOp technique was developed in the 1960s by the chemical industry ICI;
 - 1974: Cyclohexane vapor cloud explosion accident (30 t) due to failure of by-pass reactor in the chemical industry Nypro Ltd of Flixborough, England. 28 dead and 36 wounded, total plant loss and damage to nearby community property within a radius of 13 km. This accident initiated a wide use of HazOp technique in chemical industries;
 - 1984: Accidents in Mexico City, due to an explosion in LPG discharge with destruction of PEMEX plant, 542 dead and 4,248 injured in Bhopal (India) by emission of toxic methyl isocyanate cloud from the gas scrubber in plant maintenance of Union Carbide, 4,000 estimated deaths in neighboring favela, and in Cubatão (Brazil) due to pipeline leakage and gasoline fire, with 500 victims, of which 93 fatal. These major accidents, among others occurred in the 1980s, led to several actions to prevent industrial accidents and an extension of the application of HazOp to the oil, food, water treatment and distribution industries, among others;
- 1985: Publication of Guidelines for hazard evaluation procedures by the American Institute for Chemical Engineers (AIChE) establishing a model for the application of the HazOp technique;
- 1986: Publication of Resolution 1 of the National Environmental Council (CONAMA), which established the need to carry out the Environmental Impact Study (EIA) and its Environmental Impact Report (RIMA) for the licensing of activities modifying the environment. Risk analysis studies are now incorporated into this process for certain types of ventures.
 - 2001: Accident in Brazil with explosion due to natural gas leakage on platform P-36. 11 dead and sinking of the installation;
 - 2003: Accidents in Brazil with rupture of the Cataguazes bleach dam affecting several municipalities of MG and ES and the tipping of 18 FCA tank wagons with chemical leaks and interruption of water supply in Uberaba, MG, for one month ;
 - 2003: Publication of the CETESB standard P4.261 - Guidance Manual for the Elaboration of Risk Analysis Studies, which establishes criteria for the requirement of risk analysis studies in the environmental licensing processes for installation (LI) of chemical process plants, chemical storage systems, and similar ventures.

BS IEC 61882: 2001 Hazard and operability studies (HAZOP studies) - Application guide

DOE-HDBK-1100-2004 DOE Handbook Chemical Process Hazards Analysis

CETESB P4.261 Handbook for the preparation of risk analysis studies

MIL-STD-1629A: 1980 Procedures for Performing a Failure Mode, Effects and Criticality Analysis Publication of the Guidelines for hazard evaluation procedures by the American Institute for Chemical Engineers (AIChE) establishing a model for application of the HazOp technique;

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