



STUDY FACILITATION—HAZOP, HAZID/ENVID, SIL, LOPA & BOW-TIE

Study Facilitation Services

MES Ltd has vast experience in carrying out numerous studies and facilitating reviews for many clients in the Oil & Gas industry for both Onshore and Offshore installations, Refineries and Petrochemicals sectors. MES's highly experienced team of workshop facilitators and its big network of external facilitators carryout the following studies:

HAZOP - A Hazard & Operability review is a well established method for identifying potential safety and operational problems associated with the design, maintenance or operation of a system. It is a formal and objective process, where a group of experienced engineers from various disciplines assess different parts of a given system with the aid of "guidewords". This ensures a systematic and well documented evaluation of potential problems/hazards.

MES offer a HAZOP facilitation service encompassing the provision of:

- A HAZOP Chairman
- A HAZOP Secretary/Scribe
- HAZOP Software such as PHA works and Lihou HAZOP Manager.

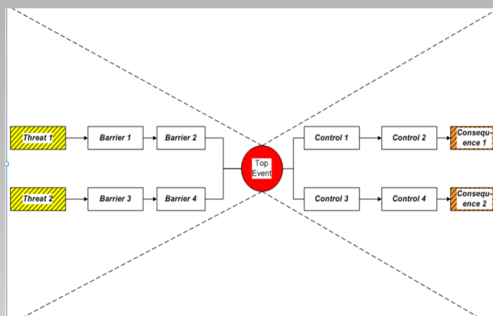
HAZID/ENVID - Hazard Identification is a process wherein a group of experienced people with relevant experience are encouraged to look at a design concept and think laterally and collectively about what hazards might be expected to arise with the equipment under design, and how the design may be altered to reduce or eliminate those hazards.

SIL & SIL verification - The main objective of a SIL study is to identify Safety Instrumented Functions (SIF) / Safety Instrumented Systems (SIS), SIL targets and SIL verification of each SIF. Two applicable International Electrotechnical Commission (IEC) standards are used: IEC 61508(2) and IEC 61511(3). A SIL assessment provides a system for assessing the actual reliability of an existing safety system or proposed safety system.

LOPA - Layers of Protection Analysis study assesses the adequacy of the Safety Protection Layers (SPLs) or Safeguards that are in place to mitigate against hazardous events relating to major process hazards, identify those SPLs or Safeguards that do not meet the required risk reduction for a particular hazard, and make reasonable recommendations where a hazard generates a residual risk that needs further risk reduction.

Bow-tie analysis or diagram development is a powerful approach to Asset Integrity management. MES Consultants are experienced in planning, facilitating and undertaking various Bow Tie Assessments within the Oil & Gas industries using Bowtie XP software. MES's approach involves:

- Assessing threats to a system;
- Identifying "safety barriers" or "safeguards" which are in place;
- Undertaking a qualitative assessment of any gaps through a Workshop facilitation with the Client representatives;
- Preparation of gap analysis sheets/ documentation.
- Constructing Bowties for Major Accident Events



Recent Study Facilitation Experience

- Granherne/Statoil - Gullfaks Compression HAZOP/HAZID/ENVID Studies.
- Kazakhstan China Pipeline (KCP) – Pipeline HAZOP Study.
- Shell – EA Riser B Platform HAZOP Study.
- Shell – AWOPA NAG HAZOP Study.
- GASCO Mirfa-1 Elixir Project Bow-tie analysis
- Granherne (HESS) – South Arne Phase III Development – Northern and Eastern Wellhead Platform Bowtie Analysis.
- Agip KCO – Kashagan Onshore Processing Facility Bow-tie analysis using THESIS
- G3 Baxi (Total) – SIL Risk Assessment for facility in Qatar.
- KBR (BP) – SIL Analysis for ACG Full Field Development.
- Petrofac (Agip) – SIL Analysis for High Integrity Process Concepts in the Concept Select Phase of Kashagan FFD.

Our Clients

- Agip KCO (Kazakhstan)
- Chrysaor
- ENI
- Granherne
- Kazakh Oil Aktobe
- Kazakh China Pipeline
- KBR (UK & Overseas);
- NCOC (Kazakhstan)
- Oman Gas Company
- Oman Refinery and Petrochemicals Company
- Penspen Group
- Petroleum Development Oman
- Petrofac (UK & Sharjah)
- PSN
- Shell
- Subsea 7
- Tecnicas Reunidas Engineering (TRE)
- Tullow Oil
- Wood Group Engineering.

