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SPECIFICATION FOR HAZOP REVIEW PROCEDURE

(PROJECT STANDARDS AND SPECIFICATIONS)

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SCOPE

This Project Standard and Specification prescribes the procedure to be used for Hazard and Operability (HAZOP) Reviews. It is prepared to precisely define the organization and the implementation methods and procedures of the HAZOP reviews to be conducted for all projects executed by the COMPANY.

This document is intended to be viewed as part of the overall PROJECT SPECIFICATION and must be read in conjunction with the other documents relevant to the PROJECT. CONTRACTOR shall identify any conflicts between this document and others and shall submit any conflicts identified to COMPANY for resolution.

Compliance with this SPECIFICATION shall not relieve CONTRACTOR of responsibility to provide overall systems and facilities that are safe, reliable, and easy to operate and easily maintained.

GENERAL

The objective of the HAZOP review is to check and investigate the design of all facilities in order to identify any potential hazard and operability problems which could arise particularly through deviations from the design intent. A set of lists of necessary actions and recommendations to improve and mitigate the consequences to the identified problems or hazards will be recorded and presented in the form of the HAZOP Report.

Project Drawings

The HAZOP review is based on the PFD's, plot plans, P&ID's and other Project documents. The latest issue of the documents shall be used for the HAZOP study. These documents will be submitted to the HAZOP team in advance (in accordance with applicable PROJECT SPECIFICATION/ procedures) so that the HAZOP team may review them prior to the HAZOP review.

These documents shall be issued at an advanced stage of engineering, (i.e. P&IDs) issued for HAZOP.

The P&IDs used for the HAZOP shall be fully drafted in CAD or equivalent as per the PROJECT SPECIFICATION and show all equipment, instruments, check valves, safety valves, etc. that are included in the design.

The P&ID set used for the HAZOP review shall be marked "HAZOP REVIEW P&ID" and shall be included in the HAZOP Report.

Apart from the P&IDs which shall be used for the HAZOP review, the HAZOP team shall have access to any other available information required for the study (equipment and instrument data sheets, cause & effect diagrams, etc.).

Applicable Documents

The following documents are applicable to this Procedure:

- API 750, Section 2 Process Safety Information (29 CFR 1910-119).
- API 750, Section 3 Process Hazard Analysis (29 CFR 1910-119).

BASIC PROCEDURE

Method

The method consists of a systematic study of all process and utility lines and equipment included in the PROJECT.

Each line will be studied as a whole, from battery limit to battery limit or to the equipment connected to the end of the line, whichever is applicable. Materials handling equipment shall be similarly treated as process lines and shall be studied in the same manner.

The HAZOP review shall cover all the process lines and systems that are part of (or may be affected by) the PROJECT facilities. This shall include EXISTING FACILITIES, both upstream and downstream that may be affected by the new PLANT. The following shall be reviewed as a minimum:

- Process Lines.
- Process Vessels.
- Process Equipment.
- Offsite Systems.
- Utility Systems.
- Fire Detection Systems.
- Fire Protection Systems.
- ESD Systems.
- Isolation at Battery Limits.
- Interface with Other Facilities.

For each line, the study will investigate the appropriate process parameters and the guidewords listed in Table 1. For each guideword, the HAZOP team will list the possible causes and the consequences regarding the operating procedures

and the safety aspects from both a personnel and material point of view. If the consequences are found to be out of the normal operating range or design intent of the system, the HAZOP team will investigate the installed safeguards:

- The detection devices, to ensure that the operator will be aware that something abnormal is happening.
- The safety devices installed, to limit the consequences of the process or external upset.

If the P&ID shows devices which are considered adequate for the considered risk, the next guideword will be reviewed, then the next parameter, then the next process line or vessel.