Safe Operation of Hydrofluoric Acid Alkylation Units

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Safe Operation of Hydrofluoric Acid Alkylation Units

0 Scope

The refining industry has long demonstrated that HF acid alkylation units can be operated safely and responsibly. Like many industrial processes, the HF acid alkylation process presents operational risk and must be properly designed, well-maintained and operated to assure safe operation. RP 751 is an industry document that communicates proven industry practices to support the safe operation of an HF acid alkylation unit. The philosophy of this fourth edition is to build on the previous editions' base of recommendations for HF acid leak prevention, detection and mitigation with the document section topics of hazard management, operating procedures and worker protection, material inspection and maintenance, transportation and inventory control, relief and utility systems, and risk mitigation. This edition changes some previous provisions from recommendations (should) to requirements (shall) based on regulatory requirements, broad industry acceptance and proven effective industry practices along with the addition of some new recommendations and requirements. The recommendations presented in the document are those that have been found effective or those which are advised for safe operations.

1 Hazards Management

1.1 Process Hazards Management Plan

1.1.1 General

Process hazards management applies to hydrofluoric acid (HF) alkylation units. These units handle liquefied petroleum gas (LPG) and HF, which if released in quantity, may cause significant fire and toxic hazards. Each operating HF alkylation unit shall have a process hazards management plan.

In the United States, the Occupational Safety and Health Administration (OSHA) regulation *Process Safety Management of Highly Hazardous Chemicals* [29 Code of Federal Regulations (*CFR*) Part 1910.119] forms the basis for process hazards management in refineries. The U.S. Environmental Protection Agency's (EPA) *Risk Management Program* (*RMP*) rule (40 *CFR* Part 68) also applies to process hazards management for facilities in the United States. Similar process hazards and risk management regulations are in place in many countries.

1.1.2 Process Hazards Analysis

1.1.2.1 Priority

A process hazards analysis is a logical first step in a process hazards management program and shall be conducted in all HF alkylation facilities. This analysis helps identify and evaluate events that could lead to releases of HF or LPG. Alkylation units should be high on the priority list of process units to be analyzed because of the dual hazards presented by HF and LPG. For the same reason, the maximum interval between analyses should be five (5) years. Applicable regulations shall be reviewed regarding the permissible interval. Once an initial process hazards analysis has been completed for the alkylation unit, each subsequent analysis may either be an update and revalidation of the previous analysis or a completely new analysis. The approach chosen should satisfy applicable regulations and should assure that the process hazards analysis is consistent with the current alkylation process.

1.1.2.2 Methods

Many analytic techniques are available to the refinery owner/operator for evaluating process hazards. AIChE's *Guidelines for Hazard Evaluation Procedures* and OSHA 29 *CFR* Part 1910.119 summarize some advantages and disadvantages of hazard analysis systems and provide guidance in selecting appropriate tools for process hazards analysis. A hazard and operability (HAZOP) study is one method of process hazards analysis appropriate to an HF alkylation unit. The final choice of analytic technique will depend on a number of site-specific criteria. There may be a