Fire Protection in Refineries

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Introduction

API's *Fire Protection in Refineries*, First Edition, appeared in 1933 as the beginning of fire safety guidance series for the "downstream" segment. This 10th Edition recommended practice builds on experience gained over seven decades.

The term fire protection used in this publication includes measures taken to prevent fires, as well as those to minimize, control, or extinguish fires already burning. A thorough approach to fire protection starts with an understanding of the ignition and combustion processes, including control of potential fuel sources with an emphasis on containment. This publication gives some basic information on these subjects and identifies sources of more detailed information. While sections of this document discuss general design principles, it is not intended as a design manual. Rather, it presents guidance for those providing fire protection services to refineries and gives reference to sources of more detailed design related information.

The information presented is based primarily upon experience in many refineries. It is not intended to exclude or limit the use of other approaches of comparable merit.

Fire protection references comprise a very large body of literature. API 2001 highlights many of these references relevant to refineries while seeking not to duplicate them. Most of these references are not incorporated as "normative," and the user is advised to determine their relevance for specific applications.

Fire Protection in Refineries

1 Purpose and Scope

1.1 Purpose

The purpose of this recommended practice is to provide a better understanding of refinery fire protection and the steps needed to promote the safe storage, handling, and processing of petroleum and petroleum products in refineries. A basic premise of this standard is that fire prevention provides the fundamental foundation for fire protection.

1.2 Scope

This document covers basic concepts of refinery fire prevention and protection. It reviews the chemistry and physics of refinery fires; discusses how the design of refinery systems and infrastructure impact the probability and consequences of potential fires; describes fire control and extinguishing systems typically used in refineries; examines fire protection concepts that should be covered in operating and maintenance practices and procedures; and provides information on organization of and training for refinery emergency responders. Many of the concepts, systems, and equipment discussed in this document are covered in detail in referenced publications, standards, or governmental requirements.

1.3 Concept of Hazard vs Risk

Hazards are situations or properties of materials with the inherent ability to cause harm. Flammability, toxicity, corrosivity, and stored electrical, chemical, or mechanical energy all are hazards associated with various industrial materials or situations.

Risk requires exposure. A hot surface or material can cause thermal skin burns or a corrosive acid can cause chemical skin burns, but these can occur only if there is contact exposure to skin.

A person working at an elevated height has “stored energy” and a fall from a height can cause injury—but there is no risk unless a person is indeed working at heights and thus exposed to the hazard. There is no risk when there is no potential for exposure.

Determining the level of risk for any activity involves understanding and recognizing hazards, then estimating the probability and severity of exposure events that could lead to harm or damage, and the resulting consequences. Principles relating hazards to the risk for people are valid for evaluating property or environmental risk. For instance, hydrocarbon vapors in a flammable mixture with air can ignite if exposed to a source of ignition resulting in a fire that could cause property damage as well as injure people. Hydrocarbons that will burn are hazardous materials—but one element of risk includes a flammable fuel-air mixture being exposed to an ignition source.

2 Normative References

The following referenced documents are indispensable for the application of this document and are normative in those geographic areas under U.S. Federal OSHA jurisdiction. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. The bibliography organizes other references and sources of additional information by primary subject area. Additional information may be available from the Internet sites cited therein.

NFPA 30 [1], *Flammable and Combustible Liquids Code*

1 National Fire Protection Association, 1 Batterymarch Park, Quincy, Massachusetts 02169, www.nfpa.org.