CGA

Compressed Gas Association

The Standard For Safety Since 1913

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GUIDELINES FOR THE LOCATION OF OCCUPIED BUILDINGS IN INDUSTRIAL GAS PLANTS

FIRST EDITION

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1 Introduction

Incidents have shown the need for the chemical industry to consider the location of both permanent and portable occupied buildings on chemical production facility sites. The ignition of flammable vapor released into a congested process area or pressure energy released from process equipment failures can impact personnel located inside these buildings. Industry groups such as the American Petroleum Institute (API), the Center for Chemical Process Safety (CCPS), and the Chemical Industry Association (CIA) have developed guides to assist these industry companies in the safe location and design of occupied buildings to improve the safety of workers. In some regions, assessing the risk to occupants in buildings within air separation unit (ASU) facilities is not specifically required by regulations.

This publication is intended to provide guidance specific to the industrial gas industry for the determination of location and design of both permanent and portable on-site occupied buildings to address the risks in ASU and HYCO plants.

The goal of this publication is to provide guidelines to:

- protect the building occupants so the building does not place the occupants at greater risk than employees located outside; and
- reduce the risk to employees not essential to the operation of the facility by locating such employees in a building that is either:
  - away from the process; or
  - reinforced and/or equipped to achieve comparable risk reduction to that achieved by distance alone.

Risk management and process safety assessment are complex subjects. Technology for determining the location of occupied facility buildings is still evolving. Some aspects of this technology require the application of technical judgement as well as proven scientific methodologies. It is the intention that this publication be used by qualified personnel. Qualified personnel are those who have sufficient training and experience in hazard identification and risk assessment.

While this publication is intended to provide an overview of the processes and evaluations used to determine safe location of occupied buildings, it is not intended to be a strict, prescriptive requirement. As individual company processes, risk targets, facility layouts, and safety procedures vary, each facility should be evaluated individually to ensure safe location of occupied buildings.

2 Scope

This publication addresses the risks to persons in occupied buildings within ASU and HYCO facility boundaries associated with pressure energy. Pressure energy can be generated from ignition of flammable material that has been released into congested or confined area and the sudden failure of pressure vessels. Section 6.4 provides criteria for the exclusion of specific pressure vessel mechanical failures from consideration.

This publication is intended to provide guidance on determining the risk to persons in:

- new permanent or portable occupied buildings on ASU and HYCO facilities;
- existing occupied buildings from a new ASU plant, HYCO plant, or major modification added to an existing facility;
- an occupied building from a relocated ASU plant, HYCO plant; and
- a relocated occupied building.

It is also intended to provide guidance on how to address hazards from neighboring facilities during the design of new ASU and HYCO plants. The provisions of this publication are effective as soon as hazardous materials are introduced into the ASU or HYCO facility.

The scope of this publication is not intended to cover the following:

- Existing buildings in existing ASU and HYCO plants;
- Occupied buildings beyond the ASU or HYCO facility boundary, as this publication is specific to on-site impacts within ASU and HYCO facilities. CCPS *Guidelines for Facility Siting and Layout*, the Seveso III Directive, and other sources provide general guidance on this topic [1, 2] [1];
- The location and design of occupied buildings as related to exposures from toxic gas releases. API RP 752, *Management of Hazards Associated with Location of Process Plant Buildings*, API RP 753, *Management of Hazards Associated with Location of Process Plant Portable Buildings*, and the CIA document *Guidance for the Location and Design of Occupied Buildings on Chemical Manufacturing Sites* provide guidance on mitigation of hazards related to a toxic release [3, 4, 5];
- The location of oxygen and inert gas vents relative to the location of buildings. EIGA Doc 154, *Safe Location of Oxygen and Inert Gas Vents* provides guidance on the safe location of oxygen and inert gas vents [6]; and
- Cryogenic spills from air separation facility equipment. Many CGA and EIGA publications provide guidance on control of cryogenic spill hazards; see Section 10 for additional references.

For industrial gas facilities not included in the scope of this standard, see NFPA 55, *Compressed Gases and Cryogenic Fluids Code* or other equivalent regional standards for siting considerations [7].

3 Definitions

For the purpose of this publication, the following definitions apply.

3.1 Publication terminology

3.1.1 Shall
Indicates that the procedure is mandatory. It is used wherever the criterion for conformance to specific recommendations allows no deviation.

3.1.2 Should
Indicates that a procedure is recommended.

3.1.3 May
Indicates that the procedure is optional.

3.1.4 Can
Indicates a possibility or ability.

3.2 Technical definitions

3.2.1 Blast
Transient change in the gas density, pressure, and velocity of the air surrounding an energy release point.

3.2.2 Building
Any permanent or portable structure that is enclosed on all sides with a roof.

3.2.3 Building siting study
Procedures to evaluate the hazards and establish the design criteria for new buildings.

3.2.4 Confinement
Physical surface that inhibits the expansion of a flame front of burning vapor in at least one direction. Examples include solid decks, walls, enclosures, or process areas.

[1] References are shown by bracketed numbers and are listed in order of appearance in the reference section.