New API RP 752
Facility Siting Requirements
and
How They Affect Your Company

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Background

- **Original 1995** – based on desire to be proactive on OSHA requirement
- **3rd Edition** – Based on Texas City incident, OSHA comments, and NEP (2009/2010)
- **API RP 753** developed for portable buildings
Guiding Principles

- Locate personnel away from process areas consistent with safe and effective operations
- Minimize the use of occupied buildings in close proximity to process areas
- Manage the occupancy of buildings in close proximity to process areas
- Design, construct, install, modify and maintain occupied buildings to protect occupants against potential hazards
- Manage the use of occupied buildings as an integral part of the design, construction, maintenance, and operation of a facility
Relationship with API RP 753

- Portable buildings specifically designed to resist significant blast loads and intended for permanent use in a fixed location are covered in API RP 752

- Portable buildings are covered by API Recommended Practice 753, *Management of Hazards Associated with Location of Process Plant Portable Buildings*
Definitions

- **Building**: a rigid, enclosed structure

- **Consequence-Based Approach**: is based on consideration of the impact of explosion, fire, and toxic scenarios which do NOT consider the frequency of events

- **Maximum Credible Event (MCE)**: a hypothetical explosion, fire or toxic event that has the maximum consequence to the occupants of the building under consideration from among the major scenarios evaluated. The major scenarios are realistic and have a reasonable probability of occurrence. . . (Each building may have its own set of MCEs for potential explosion, fire or toxic impacts)
**Major changes**

- Occupancy criteria changed to “intended for occupancy”
- Occupancy vulnerability curve deleted
- Frequency of explosions deleted
- More guidance on evaluation of fires hazards
- More guidance on evaluation of toxics hazards
Occupancy

- Buildings intended for occupancy shall be included
- A building is intended for occupancy if it has personnel assigned or it is used for recurring group personnel function

Examples
- Buildings which may become occupied during emergencies (e.g., emergency response shelters)
- Change houses
- Conference rooms
- Control rooms
- Guard houses
- Laboratories with assigned personnel
- Lunch rooms
- Maintenance shops with assigned personnel
- Offices
- Orientation rooms
- Training rooms
- Warehouse buildings with assigned personnel
Occupancy

- Buildings NOT intended for occupancy with only intermittent access
  - Analyzer buildings/shelters
  - Field sampling/testing stations
  - Electrical substations & MCCs
  - Remote instrumentation enclosures
  - Equipment enclosure buildings
  - Abandoned buildings
  - Enclosed process area
Occupancy

- Buildings that need evaluation on a case-by-case basis include:
  - Smoking facilities
  - Weather shelters
  - Dock or loading stations
  - Restrooms buildings

- Tents, fabric enclosures and other soft sided structures are excluded from the scope of API RP 752
Evaluation Process

- Designed to give flexibility
- No guidance on selection of scenarios
- Requires a mitigation plan with a prioritized list of buildings
- New or modified buildings shall meet the specific company criteria for explosion, fire, and toxic hazards
- Personnel performing evaluations shall be competent in methodologies used
- Develop policies and procedures to address occupancy in buildings intended for occupancy
Approaches

- The “Consequence-Based” approach takes into consideration the impact of explosion, fire, and toxic scenarios based on MCEs for each building and type of hazard considered.

- The "Risk-Based” approach is quantitative and takes into consideration numerical values for both the consequences and the frequencies.

- The “Spacing Tables” approach uses established tables to determine separation distances from equipment to occupied buildings. Owners/operators shall determine the appropriateness of spacing tables to be used. Scenario selection is not required for spacing tables.
Management of Change

- Occupancy status changes from not intended for occupancy to intended for occupancy

- Changes to plant operations, processes or equipment (including decommissions or additions) cause a change in potential for, or severity of, explosion, fire or toxic impacts at the building location

- A new building intended for occupancy is added to the site

- There is a modification or addition to an exiting building that could cause a change in potential for, or severity of, explosion, fire or toxic impacts occur
Explosion

- Methods
  - TNO multi-energy
  - Baker-Strehlow-Tang
  - Congestion assessment method (CAM)
  - Not TNT

- Several approaches
  - Assume full volume
  - Partial volume
  - Dispersion calculated congested volumes
**Explosion**

- Building response to blast load (no more occupant vulnerability chart)

- Two approaches:
  - Building level blast analysis
  - Detailed blast analysis
Building Level Blast Analysis

- Uses tools that relate overall building performance or damage levels to blast pressure and/or impulses. They are typically charts or tables (or software that automate use of charts or tables) developed based on an analysis of representative buildings.

- Limitations
  - Damage levels that cite pressure only (duration)
  - Table 4 in API RP 752 2nd Edition SHALL not be used
  - Building that is not a structural match should have a detailed structural analysis.
Detailed Blast Analysis

- Uses appropriate dynamic analysis methods to assess structural response of individual structural components (beams, columns, slabs, frames, etc.) to blast loading. As part of the Detailed Blast Analysis process, structural response criteria for building components shall be established.

- New buildings design for blast loading shall have a detailed structural analysis performed.
Fire

- Spacing table approach (CCPS, IRI, PIPs)
- Fire modeling for pool and jet fires
- Flash fires and fireballs are short duration events and can be excluded
- Options for buildings exposed to fire as defined in your emergency response plan
  - Shelter-in-place
  - Evacuation
- New building designed for conditions
Fire Shelter-in-Place

- Fire resistance capability of building
- Length of time personnel are required to remain in building
- Length of time that the flammable material or fire impedes escape from the building
Fire Evacuation

- Emergency exits located in such a manner to allow exit away from the nearest fire hazards
- Mustering stations located away from potential fire hazards
- Emergency response procedures, evacuation routes and training that will facilitate evacuation
Toxics

- Can assume all buildings can be impacted or perform dispersion modeling

- Toxic material exposure depends on the dosage (concentration and duration)

- Options for buildings exposed to fire as defined in your emergency response plan
  - Shelter-in-place
  - Evacuation

- New building designed for conditions
Toxic Shelter-in-Place

- Heating, ventilation and air conditioning systems (HVAC) systems capable of shutdown of the system or placement in recirculation mode, whichever is more appropriate
- System to notify occupants of external toxic material release
- Positive pressure against infiltration of outside air for penetrations through exterior surfaces
- Emergency communications equipment (telephones are acceptable)
- PPE as necessary for scenario potential exposure
- Seals for windows and doors
Toxic Evacuation

- Method to detect and notify occupants of external toxic material release
- Evacuation plan that directs personnel to a designated “shelter in place” or specified assembly area
- Plan to account for occupants
- PPE as necessary for scenario potential exposure
Steps to Consider

- Update your procedure or standard on facility siting
  - Intended for occupancy
  - Explosion calculation method
  - Spacing table for fire
  - Toxic approach
  - Competent person
  - Frequency of explosion
  - Structural evaluation
  - Consequence or risk-based

- Redo now or as part of revalidation

- Procedures for managing people movement

- **Written** mitigation plan in place
Potential Impact

- There will be more building that require evaluation based on intended for occupancy
- There will be additional building structural evaluation required
- Calculation of frequency is required for Risk-based approach
Thank You!

- Questions

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