

## **PRESSURE SAFETY**

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### **1.0 SCOPE**

This Performance Assessment Guide for Pressure Safety will be used to carry out the oversight responsibility of the U.S. Department of Energy (DOE) Brookhaven Group. This guide was prepared to assist in conducting performance-based assessments of both DOE prime contractors and subcontractors to ensure that their pressure safety programs identify, disposition, and take corrective action on issues that affect satisfactory facility performance. The goals are to ensure that laboratory employees and the public do not experience injuries and illness as a result of a pressure system or component failure and that there is little or no economic loss to the Government.

Pressure safety performance assessments will be directed at all prime contractors and subcontractors working at DOE sites. DOE line management must ensure that the laboratory complies with DOE Orders and Federal and State regulations. Information developed from this assessment will determine the degree to which this is being done as well as the effectiveness of the laboratory's program for pressure safety.

Pressure safety applies to all systems and components under pressure at DOE facilities. Systems and components under pressure include any container, volume, closed or open system, or confined space that is at a pressure greater than or less than the surrounding atmospheric pressure.

### **2.0 ATTRIBUTES AND LINES OF INQUIRY**

This section provides lines of inquiry to help assess whether the laboratory management organization has implemented a program that ensures that pressure safety requirements are incorporated into line activities. This section will be used to evaluate the laboratory's line organization.

**2.1** The laboratory has identified the locations within the site where pressure safety concerns exist.

- Does the scope of the laboratory's guidance include—
  - Storage tanks?

- Compressed gas cylinders?
  - Compressed gas welding carts?
  - Air systems?
  - Steam systems?
  - Hydraulic systems?
  - Portable equipment?
  - Temporary equipment?
  - Pumped or pressurized liquids?
  - Tank of equipment under a relative vacuum?
  - Storage facilities for volatile or reactive substances?
  - Storage facilities for pressurized containers?
- How are these hazards identified at the site? Are special procedural caution or warning signs posted or color-coding used, for instance, to alert employees of potential pressure safety hazards?
  - Are markings/labeling of pressure systems based on applicable standards/specifications (i.e., OSHA, ANSI, DOT, etc.)?

**2.2** The laboratory's training programs ensure that individuals working around pressurized equipment know where hazards exist and how to work safely around them.

- Are the applicable governing regulations and standards addressed or described in the training program?
- Does the training program address pressure safety concerns, requirements, and practices to be followed at the facility?
- Does the training clearly identify who has responsibility for implementing the pressure safety program?
- Are personnel who are in a position to detect and control performance of work on pressurized systems appropriately trained and instructed so that the required level of performance is maintained?
- Is the training of pressure safety provided on a periodic basis?
- Does a review of the training documentation show that the course content is comprehensive?

- When training has not yet been received, how is certainty provided that the correct and necessary actions will be carried out by the assigned individual (compensatory measures)?
- Has training been provided to all who are required to work on, with, or around pressurized equipment?
- When the level of responsibility changes, is additional training required and provided?
- Do interviews with workers show that they understand the importance and application of pressure safety at the facility?
- Are there special training or certification requirements for individuals who work on pressurized equipment?

**2.3** The laboratory's program ensures that modifications incorporate the required safety design criteria for pressurized systems.

- Are there design processes in place to ensure that new systems are designed to meet safety criteria with respect to pressure safety?
- Are applicable design codes and standards referenced in the modification program for the facilities, and are these documents readily accessible?
- Does the design of the system allow workers to safely operate and maintain the equipment? Are pressure systems equipped with readily available pressure indications, adequate isolation capability, vents to allow depressurization, shields to protect against physical damage to pressurized systems, and reliable fittings and components that are appropriate and approved for the use intended?
- Does the laboratory have an accessible process for documenting the current system design information?
- Are existing installations reviewed against the pressure safety design criteria?

**2.4** Pressurized systems are inspected and tested to ensure worker safety.

- Is there a periodic inspection program to ensure that components of pressurized systems maintain their pressure integrity? Are formally scheduled reviews conducted and documented of relief device functional checks, hose inspections/replacement, valve maintenance and testing, and regulator maintenance and adjustments?
- Are relief paths periodically inspected to ensure they are unobstructed and intact?

- Is postmaintenance testing performed on pressure systems and components to verify proper performance prior to their return to service?
- Do maintenance procedures and records indicate that the applicable codes, standards, specifications, and requirements are described and satisfied?
- Is there a program for reporting system pressure leaks or abnormal pressure excursions, with root cause investigation and corrective actions?
- Has the possibility of “water hammer” been considered?

**2.5** During maintenance on pressurized systems, adequate controls are in place to protect the workers.

- What procedural documents provide the guidance that is used to implement the process?
- Do the laboratory's procedures ensure that contractors are aware of their responsibilities with respect to the pressure safety program?
- Are there special procedure requirements (i.e., two-man rule, additional reviews or approvals) when working on pressurized systems?
- Do procedures specifically require workers to isolate and bleed off the system pressure prior to working on a system?
- Are there restrictions on which workers are allowed to work on pressurized systems?
- Are locking devices (e.g., lockout/tagout) used to ensure that accidental repressurization cannot occur?
- Are there practices (e.g., lockout/tagout) for deenergizing and depressurizing systems and components when not in use?
- Do maintenance workers have special equipment or tools needed to work on pressurized systems safely?
- Is Preventive Maintenance (PM) based on manufacturer's recommendations, engineering reviews, industry experience, or reliability-centered maintenance programs, or a combination?
- Are pressure system components repaired or replaced before component failures occur?

- 2.6** The laboratory has a comprehensive and effective program for the operation of pressure systems to ensure worker safety.
- What procedural documents provide the guidance that is used to implement the process?
  - Do the safety procedures ensure that contractors are aware of their responsibilities with respect to the pressure safety program?
  - Are there operational controls (e.g., lockout/tagout) for maintaining the boundaries of pressure systems and components, such as on the opening of valves that would expand the boundary?
  - Are there operational controls for transport, storage, applications, inspection, and refilling of portable gas cylinders?
  - Are there operational controls over the use of temporary rigs, devices, or set-ups such as flexible hoses that could potentially be used in a pressurized service?
  - Are there operational controls over the mixing of potentially reactive or incompatible substances that could create a pressure excursion?
  - Are there procedures for response to a pressure hazard emergency?
- 2.7** The laboratory periodically reviews the implementation of the pressure safety aspects of the safety program to ensure that the program is comprehensive and effective.
- Is the safety program current with respect to pressure safety requirements?
  - Have the program reviews been timely and thorough?
  - What types of changes have been made to the program? Why were they made? Have they been effective?
  - What is the laboratory's current assessment of the status of their performance in implementing the pressure safety program?
- 2.8** The laboratory's self-assessment group periodically evaluates the effectiveness of the implementation of the pressure safety program.
- Does the self-assessment group monitor the activities so that they can determine if the site has properly implemented a pressure safety program?
  - When did the self-assessment group last evaluate pressure safety?
  - When is the next evaluation planned?
  - What types of problems have been found?

- How responsive is the laboratory to correcting the deficiencies found?
- What performance trending is required and performed by the laboratory?
- How is the DOE Occurrence Reporting and Processing System used to identify trends and pressure safety problem areas?
- How are pressure safety lessons learned, generated either locally or from other facilities, applied to the program?

**2.9** The laboratory's program has been effective at preventing accidents involving employees working on or with pressurized systems.

- Does a review of the accidents over the past year indicate any trends related to pressure safety concerns?

**2.10** A walkthrough of the site facilities indicates that the laboratory's program is effective in ensuring that pressurized systems are safe to operate.

- Does the walkthrough of the site indicate that the maintenance criteria are being met?
- Do site walkthroughs indicate that good practices are being followed by laboratory employees while working on pressurized systems?
- Does a walkthrough of the site indicate that pressure hazards have been identified?
- Do the findings of the walkthrough confirm the effectiveness of the self-assessment organization?

### **3.0 STANDARDS AND REQUIREMENTS**

**3.1** Specific DOE Orders and Standards.

- DOE O 232.1A, "Occurrence Reporting and Processing of Operations Information."
- DOE O 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees."
- DOE 2300.1B, "Audit Resolution and Followup."
- DOE 2321.1B, "Auditing of Programs and Operations"
- DOE 5480.4, "Environmental Protection, Safety, and Health Protection Standards."
  - DOE 5700.6C, "Quality Assurance"

### 3.2 Title 10 CFR Requirements.

- 10 CFR 830.120, "Quality Assurance requirements for DOE Nuclear Facilities."

### 3.3 Title 29 CFR Part 1910 Requirements.

- Subpart H, "Hazardous Materials."
  - Section 1910.101, "Compressed Gases (General Requirements)."
  - Section 1910.102, "Acetylene."
  - Section 1910.103, "Hydrogen."
  - Section 1910.104, "Oxygen."
  - Section 1910.105, "Nitrous Oxide."
  - Section 1910.106, "Flammable and Combustible Liquids."
  - Section 1910.107, "Spray Finishing Using Flammable and Combustible Materials."
  - Section 1910.110, "Storage and Handling of Liquefied Petroleum Gases."
- Subpart J, "General Environmental Controls."
  - Section 1910.147, "The Control of Hazardous Energy (Lockout/Tagout)."
- Subpart M, "Compressed Gas and Compressed Air Equipment."
  - Section 1910.169, "Air Receivers."
- Subpart O, "Machinery and Machine Guarding."
  - Section 1910.217, "Mechanical Power Presses."
  - Section 1910.218, "Forging Machines."
- Subpart Q, "Welding, Cutting, and Brazing."
  - Section 1910.253, "Oxygen-Fuel Gas Welding and Cutting."

### 3.4 Industry-Consensus Codes and Standards.

- Compressed Gas Association (CGA) Pamphlets.

- DOT Specifications and Regulations, Title 49 CFR Chapter I, and Parts 171-179.
- ASME B&PV Code Sections I and VIII, and API-ASME Code.
- ANSI B31.1, B31.3, B31.5, B-19, Z48.1, H38.7, B57.1, A13.1.
- NFPA Code.
- API Standard 620.
- ASTM Procedures.
- UL Inc. Subjects.

#### **4.0 GUIDANCE TO ASSESSOR**

This assessment guide is intended to assist in conducting a performance assessment of pressure safety. It is not to be considered as all-inclusive, inflexible, or limiting reasonable assessment concentration when lines of inquiry responses dictate that an area must be more thoroughly probed.

It is anticipated that the general program review lines of inquiry will take no more than a few days, depending on the size of the site or facility.