**Conduct of Engineering**

**Request for Variance or Alternate Method**

**Assigned by SMPO or SMPOR:**  
- [x] Alternate Method  
- [ ] Variance  
**Tracking number VAR-2015-045**

### Affected Document(s)

<table>
<thead>
<tr>
<th>Document Type</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Processes (e.g., P 341)</td>
<td></td>
</tr>
<tr>
<td>Engineering Standards (e.g., P 342)</td>
<td></td>
</tr>
<tr>
<td>Engineering Training &amp; Qualification (e.g., P 343)</td>
<td></td>
</tr>
</tbody>
</table>

If against P documents themselves, revision: ____________

### Specific Requirement(s) as Written in the Document(s)

5. Throughout this document there are references to specific ASME code paragraphs or sections. For most cases across the Laboratory, the appropriate codes are B31.3 and Section VIII of the Boiler and Pressure Vessel Code. However, the most applicable code must be used for design, fabrication, inspection, and testing; take requirements in this document referring to or taken from B31.3 to mean the corresponding provisions in the applicable B31 code.

### 2.0 Request

**Brief descriptive title:**

Acceptance of Relief Devices for Use at LANL for Pressure Systems Within the Scope of B31.3

<table>
<thead>
<tr>
<th>NCR required (work has occurred)?</th>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>TA-Bldg-(Room) and/or Project Affected</td>
<td>System/Component Affected</td>
<td></td>
</tr>
<tr>
<td>LANL</td>
<td>Pressure systems requiring relief protection</td>
<td></td>
</tr>
</tbody>
</table>

### Proposal

Acceptance of ASME stamped devices as listed devices for pressures greater than 15 psig.

Acceptance of non-ASME stamped devices as listed devices for pressures less than or equal to 15 psig.

### Justification/Compensatory Measures

See Attachment

### Summary

For all pressure systems:
ASME stamped relief devices may be used as listed valves within the service conditions allowed by the manufacturer.

Un-stamped relief devices may be used less than or equal to 15 psig within the service conditions allowed by the manufacturer.

Un-stamped relief devices above 15 psig must be evaluated in accordance with ASME B31.3 304.7.2 Unlisted Components, and to the requirements of 322.6 Pressure-Relieving Systems.

Attachments:
- Justification/Compensatory Measures (3 pages with background citations)
- ASME B31.3 2014 Draft Response for Action Item: B-15-08
- ASME Presentation for ASME B&PVC Section XIII

<table>
<thead>
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<th>Duration of Request:</th>
<th>Start Date: 05 05 2015</th>
<th>End Date:</th>
<th>☑️ Lifetime</th>
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<tr>
<td>Requestor</td>
<td>Z Number 235211</td>
<td>Organization ES-EPD</td>
<td>Signature</td>
</tr>
<tr>
<td>Design Authority Representative</td>
<td>Z Number 106351</td>
<td>Organization ES-DO</td>
<td>Signature</td>
</tr>
<tr>
<td>LANL Owning Manager (FOD or Programmatic)</td>
<td>Z Number 106351</td>
<td>Organization ES-DO</td>
<td>Signature</td>
</tr>
</tbody>
</table>

3.0 Safety Management Program Owner (SMPO) Representative (SMPOR/POC)

☐ Decline  ☑️ Accept  ☐ Accept Labwide  ☐ with Modification:

POC
Ari Ben Swartz  Z Number 235211  Signature  Signature on file  Date 5/5/15

4.0 Additional Approval for P341 and APs; P342, ESM, Code, and Regulation Matters; and P343

☒ Accepted  ☐ Accepted with comments  ☐ Declined

Comments:
Based on attached information

Safety or Security Management Program Owner
Lawrence Kenneth Goen  Z Number 106351  Signature  Signature on file  Date 5/6/15
Justification/Compensatory Measures

The ASME B31 piping codes address relief devices differently. ASME B31.1 requires the devices meet ASME Boiler and Pressure Vessel Code (B&PVC) Section I Rules for Construction of Power Boilers, and Section VIII Division 1, Rules for Construction of Pressure Vessels.

ASME B31.3 is different. B31.3 only allows listed components and the only listed relief devices are those that comply with API 526 Flanged Steel Pressure Relief Valves. The B31.3 does not accept items in accordance with the ASME B&PVC Section I Rules for Construction of Power Boilers, or Section VIII Division 1, Rules for Construction of Pressure Vessels. Instead, it references only parts of the UG requirements for the relief devices that are contained in the ASME B&PVS VIII Division 1. One of the paragraph sections it does not include is UG-129 Marking so that a relief device does not require an ASME stamp to be used for B31.3 piping systems.

The ASME quality stamping program for relief devices is utilized as an industrial standard to ensure that a relief device functions properly at the correct temperature and pressure and relieves the rated quantity over time. The ASME B31.1 committees recognize the value of utilizing a stamped relief device as the main over pressure protection device.

I raised this issue during the biennial B31.3 committee meeting the design subgroup April 20 -23, 2015. An action item number B-15-08 was assigned. I have attached the paragraph change I recommended to 322.6.3 Pressure-Relieving Devices.

In addition, in a separate action the ASME has a request to create a new ASME &PVC Section XIII, Rules for Overpressure Protection, which received unanimous SCSVR approval. One of the major goals will be the consolidation and standardization of rules for relief protection.

Until such time as the ASME 322.6.3 rules are changed, the ASME stamped relief devises may be evaluated and accepted as unlisted components by applying 304.7.2 (a), so that LANL may accept an utilize the stamped relief devices by having “extensive, successful service under comparable conditions with similarly proportioned components of the same or like material” with this Alternative Method servicing as the documentation available for approval by the owner.

If an ASME stamped relief device set pressure is within the range allowed by the manufacture, the valve is rated for all the service temperatures and pressures, and the relief flow rates are equal to or greater than all challenges to meet the over pressure restriction of the B31.3 code the device may be considered as meeting the evaluation criteria for 304.7.2 (a).

For those systems where relief protection is required at less than or equal to 15 psig, and because no ASME stamp may be applied these relief devices shall be considered as listed when they meet the following criteria: 1) relief device set pressure is within the range allowed by the manufacture 2) the valve is rated for all the service temperatures and pressures, and 3) the relief flow rates are equal to or greater than all challenges to meet the over pressure restriction of the B31.3 code.

Summary

ASME stamped relief devices may be used as listed valves within the service conditions allowed by the manufacturer.

Un-stamped relief devices may be used less the 15 psig within the service conditions allowed by the manufacturer.

Un-stamped relief devices above 15 psig must be evaluate in accordance with ASME B31.3 304.7.2 Unlisted Components.
Background: Citations in ASME B31.3 and B31.1

ASME B31.3 2014

304.7.2 Unlisted Components. Pressure design of unlisted components to which the rules elsewhere in para. 304 do not apply shall be based on the pressure design criteria of this Code. The designer shall ensure that the pressure design has been substantiated through one or more of the means stated in subpars. (a) through (d) below. Note that designs are also required to be checked for adequacy of mechanical strength as described in para. 302.5. Documentation showing compliance with this paragraph shall be available for the owner’s approval.

(a) extensive, successful service experience under comparable conditions with similarly proportioned components of the same or like material.
(b) experimental stress analysis, such as described in the BPV Code, Section VIII, Division 2, Annex 5.F. (14)
(c) proof test in accordance with ASME B16.9, MSS SP-97, or Section VIII, Division 1, UG-101.
(d) detailed stress analysis (e.g., finite element method) with results evaluated as described in Section VIII, Division 2, Part 5. The basic allowable stress from Table A-1 shall be used in place of the allowable stress, S, in Division 2 where applicable. At design temperatures in the creep range, additional considerations beyond the scope of Division 2 may be necessary.
(e) For any of the above, the designer may interpolate between sizes, wall thicknesses, and pressure classes, and may determine analogies among related materials.

322.6.3 Pressure-Relieving Devices

(a) Pressure-relieving devices required by para. 301.2.2(a) shall be in accordance with the BPV Code, Section VIII, Division 1, UG-125(c), UG-126, UG-127, and UG-132 through UG-136, excluding UG-135(e) and UG-136(c). The terms design pressure\(^{10}\) and piping system shall be substituted for maximum allowable working pressure and vessel, respectively, in these paragraphs. The required relieving capacity of any pressure-relieving device shall include consideration of all piping systems that it protects.

(b) Relief set pressure\(^{11}\) shall be in accordance with Section VIII, Division 1, with the exceptions stated in alternatives (1) and (2), below.

(1) With the owner’s approval the set pressure may exceed the limits in Section VIII, Division 1, provided that the limit on maximum relieving pressure stated in (c) below will not be exceeded.

(2) For a liquid thermal expansion relief device that protects only a blocked-in portion of a piping system, the set pressure shall not exceed the lesser of the system test pressure or 120% of design pressure.

(c) The maximum relieving pressure\(^{12}\) shall be in accordance with Section VIII, Division 1, with the exception that the allowances in para. 302.2.4(f) are permitted, provided that all other requirements of para. 302.2.4 are also met.

\(^{10}\) The design pressure for pressure relief is the maximum design pressure permitted, considering all components in the piping system.

\(^{11}\) Set pressure is the pressure at which the device begins to relieve, e.g., lift pressure of a spring-actuated relief valve, bursting pressure of a rupture disk, or breaking pressure of a breaking pin device.

\(^{12}\) Maximum relieving pressure is the
326 DIMENSIONS AND RATINGS OF
COMPONENTS
326.1 Dimensional Requirements

326.1.1 Listed Piping Components. Dimensional standards for piping components are listed in Table
326.1. Dimensional requirements contained in specifications listed in Appendix A

Flanged Steel Pressure-Relief Valves API 526 (contained in table 326.1)

ASME B31.1 2014
100.1 Scope
100.1.2
The valve or valves required by para. 122.1 are part of the boiler external piping, but do not require ASME Boiler
and Pressure Vessel Code, Section I inspection and stamping except for safety, safety relief, and relief valves; see
para. 107.8.2. Refer to PG-11.

component: component as used in this Code is defined as consisting of but not limited to items such as pipe, piping
subassemblies, parts, valves, strainers, relief devices, fittings, etc.

ASME B31.1 2014
107.8.2 Pressure-Relieving Valves on Boiler External Piping.
Safety, safety-relief, and power-actuated pressure-relieving valves on boiler external piping shall be in accordance
with para. 122.1.7(D.1) of this Code.
107.8.3 Pressure Relief Requirements on Nonboiler External Piping
   (A) Reheater safety valves on reheat piping shall conform to para. 122.1.7(D.1).
   (B) Safety, safety–relief, relief, and pilot-operated pressure relief valves shall be in accordance with UG-
126 of ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.
   (C) Nonre clos ing pressure relief devices, such as rupture disks, pin devices/valves, and spring-loaded
nonre closing devices shall be in accordance with UG-127 of Section VIII, Division 1.
   (D) Valves and devices in (B) and (C) above shall be constructed, manufactured, rated, and marked in
accordance with the requirements of UG-128 through UG-132 and UG-136 through UG-138 of Section
VIII, Division 1.
   (E) An ASME Code Stamp and capacity certification are not required for valves with set pressures 15 psig
[100 kPa (gage)] and lower.
107.8.4 Nonmandatory Appendix. For nonmandatory rules for the design of safety valve installations, see
Nonmandatory Appendix II of this Code.

122.1.7 Valves and Fittings.
   (D) Pressure-Relieving Valves
   (D.1) Safety, safety–relief, and power-actuated pressure-relieving valves shall conform to the requirements
of PG-67, PG-68, PG-69, PG-70, PG-71, PG-72, and PG-73 of Section I of the ASME Boiler and Pressure
Vessel Code.

126 MATERIAL SPECIFICATIONS AND STANDARDS
FOR STANDARD AND NONSTANDARD PIPING
COMPONENTS
126.1 Standard Piping Components
Dimensions of standard piping components shall comply with the standards and specifications listed in
Table 126.1 in accordance with para. 100.
   Table 126.1 (no reference for relief device standard)
<table>
<thead>
<tr>
<th>Item Number</th>
<th>Existing Code (ASME B31.3 2014)</th>
<th>Proposed Revision (redlined mode)</th>
<th>Proposed Revision (redlines accepted)</th>
<th>Comments</th>
</tr>
</thead>
</table>
| 1           | 322.6.3 Pressure-Relieving Devices (a) Pressure-relieving devices required by para. 301.2.2 (a) shall be in accordance with the BPV Code, Section VIII, Division 1, UG-125(c), UG-126, UG-127, and UG-132 through UG-136, excluding UG-135(e) and UG-136(c). The terms design pressure and piping system shall be substituted for maximum allowable working pressure and vessel, respectively, in these paragraphs. The required relieving capacity of any pressure-relieving device shall include consideration of all piping systems that it protects. (b) Relief set pressure shall be in accordance with Section VIII, Division 1, with the exceptions stated in alternatives (1) and (2), below. (1) With the owner’s approval the set pressure may exceed the limits in Section VIII, Division 1, provided that the limit on maximum relieving pressure stated in (c) below will not be exceeded. | 322.6.3 Pressure-Relieving Devices (a) Pressure-relieving devices required by para. 301.2.2 (a) shall be in accordance with the BPV Code, Section VIII, Division 1. The terms design pressure and piping system shall be substituted for maximum allowable working pressure and vessel, respectively, in these paragraphs. The required relieving capacity of any pressure-relieving device shall include consideration of all piping systems that it protects. (1) Safety, safety–relief, relief, and pilot-operated pressure relief valves shall be in accordance with UG-126 of ASME Boiler and Pressure Vessel Code, Section VIII, Division 1. (2) Nonreclosing pressure relief devices, such as rupture disks, pin devices/valves, and spring-loaded nonreclosing devices shall be in accordance with UG-127 of | 322.6.3 Pressure-Relieving Devices (a) Pressure-relieving devices required by para. 301.2.2 (a) shall be in accordance with the BPV Code, Section VIII, Division 1. The terms design pressure and piping system shall be substituted for maximum allowable working pressure and vessel, respectively, in these paragraphs. The required relieving capacity of any pressure-relieving device shall include consideration of all piping systems that it protects. (1) Safety, safety–relief, relief, and pilot-operated pressure relief valves shall be in accordance with UG-126 of ASME Boiler and Pressure Vessel Code, Section VIII, Division 1. (2) Nonreclosing pressure relief devices, such as rupture disks, pin devices/valves, and spring-loaded nonreclosing devices shall be in accordance with UG-127 of | The ASME B&PVC Section I, Section III, Section IV, Section VIII, Section X (references Section VIII), Section XII (references Section VIII), and B31.1 require ASME stamped relief devices. ASME B31.1 does not cite API 526, Flanged Steel Pressure-relief Valves, as a listed item. Instead they directly reference the items in the ASME Section I or Section VIII. This proposed change will not affect the application of the API 526 because it requires that relief devices be “designed and manufactured in accordance with the applicable requirements of ASME BPVC, Section VIII for pressure-relief devices”.

ASME is requesting a new ASME B&PVC Section XIII, Rules for Overpressure Protection, that will consolidate all overpressure protection technology into one book for the benefit of all stakeholders.

Table 326.1

B31.1-2014, Power Piping

107.8 Pressure-Relieving Valves and Devices 107.8.1 General. Pressure-relieving valves and devices shall conform to the requirements specified in this Code for flanges, valves, and fittings for the pressures |
<table>
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<tr>
<th>Item Number</th>
<th>Existing Code (ASME B31.3 2014)</th>
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| (2)         | For a liquid thermal expansion relief device that protects only a blocked-in portion of a piping system, the set pressure shall not exceed the lesser of the system test pressure or 120% of design pressure. | Section VIII, Division 1. (3) Valves and devices in (1) and (2) above shall be constructed, manufactured, rated, and marked in accordance with the requirements of UG-128 through UG-132 and UG-136 through UG-138 of Section VIII, Division 1. (4) An ASME Code Stamp and capacity certification are not required for valves with set pressures 15 psig [100 kPa (gage)] and lower. (b) Relief set pressure shall be in accordance with Section VIII, Division 1, with the exceptions stated in alternatives (1) and (2), below. | Section VIII, Division 1. (3) Valves and devices in (1) and (2) above shall be constructed, manufactured, rated, and marked in accordance with the requirements of UG-128 through UG-132 and UG-136 through UG-138 of Section VIII, Division 1. (4) An ASME Code Stamp and capacity certification are not required for valves with set pressures 15 psig [100 kPa (gage)] and lower. (b) Relief set pressure shall be in accordance with Section VIII, Division 1, with the exceptions stated in alternatives (1) and (2), below. | and temperatures to which they may be subjected. 107.8.2 Pressure-Relieving Valves on Boiler External Piping: Safety, safety-relief, and power-actuated pressure-relieving valves on boiler external piping shall be in accordance with para. 122.1.7(D.1) of this Code. 107.8.3 Pressure Relief Requirements on Nonboiler External Piping: (A) Reheater safety valves on reheat piping shall conform to para. 122.1.7(D.1). (B) Safety, safety–relief, relief, and pilot-operated pressure relief valves shall be in accordance with UG-126 of ASME Boiler and Pressure Vessel Code, Section VIII, Division 1. (C) Nonreclosing pressure relief devices, such as rupture disks, pin devices/valves, and spring-loaded nonreclosing devices shall be in accordance with UG-127 of Section VIII, Division 1. (D) Valves and devices in (B) and (C) above shall be constructed, manufactured, rated, and marked in accordance with the requirements of UG-128 through UG-132 and UG-136 through UG-138 of Section VIII, Division 1. (E) An ASME Code Stamp and capacity certification are not required for valves with set pressures 15 psig [100 kPa (gage)] and lower. 107.8.4 Nonmandatory Appendix. For nonmandatory rules for the design of safety valve installations, see Nonmandatory Appendix II of this Code. (D) Pressure-Relieving Valves (D.1) Safety, safety–relief, and power-actuated pressure-relieving valves shall conform to the requirements of PG-67, PG-68, PG-69, PG-70, PG-
<table>
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<tr>
<td>(c) The maximum relieving pressure (12) shall be in accordance with Section VIII, Division 1, with the exception that the allowances in para. 302.2.4(f) are permitted, provided that all other requirements of para. 302.2.4 are also met. Note: Other relief devices may be used provided an evaluation is performed in accordance with paragraph 304.7.2.</td>
<td>(c) The maximum relieving pressure (12) shall be in accordance with Section VIII, Division 1, with the exception that the allowances in para. 302.2.4(f) are permitted, provided that all other requirements of para. 302.2.4 are also met. Note: Other relief devices may be used provided an evaluation is performed in accordance with paragraph 304.7.2.</td>
<td>71, PG-72, and PG-73 of Section I of the ASME Boiler and Pressure Vessel Code. API Standard 526 Sixth Edition, April 2009, Errata, May 2009, Errata 2, October 2012, Flanged Steel Pressure-relief Valves 7 Design 7.1 General Pressure-relief valves discussed in this standard shall be designed and manufactured in accordance with the applicable requirements of ASME BPVC, Section VIII for pressure-relief devices.</td>
<td>Remove reference to API 526 from Table 326.1</td>
<td></td>
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<tr>
<td>2</td>
<td>(Table 326.1) Flanged Steel Pressure-Relief Valves . . . . API 526</td>
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</tbody>
</table>
Request for the Development of a New ASME Standards Activity

Section XIII – Rules for Overpressure Protection

October 20, 2014
What

- Consolidate all overpressure protection technology into one book for the benefit **all stakeholders**

- Advance the technology with participation by a broader SME pool

- The application of that technology:
  - Remains with the book committees
  - Be available for non-vessel stakeholders
Why

• Many requirements are duplicated in multiple books
• Structure delays and/or discourages the adoption of new technology
  – Pressure relief valves for < 15 psig
• ASME does not have a single internationally recognized document such as ISO 4126
  – ASME Vessels and Boilers with ISO 4126 pressure relief devices
• Devices used for piping, pumps, compressors, turbines, etc.
Section XIII – Rules for Overpressure Protection

ASME Request for Development of a New Standard

C&SC
13-663

Questionnaire
Supplement

Unanimous
SCSVR
Approval

Request for the Development of a New ASME Standards Activity
13-663 January 16, 2014

1. Provide the title and scope of the proposed standard. [Note: This includes technical reports and guides.]

Title: Boiler & Pressure Code Section XIII – Rules for Overpressure Protection

Scope: This standard provides the requirements for pressure relief devices or system design used to protect against overpressure in pressurized equipment. It establishes rules for each type of pressure relief device including materials, design, construction, settings, testing, and capacity certification as well as performance testing and installation requirements for pressure relief devices and conceptual requirements for system design. See Supplement

2. Identify the affected stakeholders/user and the need(s) the proposed standard is intended to address. If possible, provide rationale materials (including documents suitable as the basis for a first draft).

The affected stakeholders/user include:
1) BPV Standards Committee
2) BPV Certificate Holders
3) Other Sections and Divisions of the BPV Code, Piping Codes and other National and International Standards/Regulations/Directives
4) International pressure relief device manufacturers that are not ASME certificate holders
5) Pressure relief manufacturers of non-ASME certification marked devices (i.e. - 15 psi)
6) Users including:
   - End users
   - Equipment owners/operators including their engineering staff
   - Design Firms
   - Relief device repair organizations
   - Inspection agencies

There are many Recognized and Generally Accepted Good Engineering Practice (RAGA/GEP) that address various aspects of pressure relief systems but none can be considered a comprehensive resource. This new standard is needed to bring uniformity to the requirements for overpressure protection devices, not only within the ASME Codes, but for all industries and users. The long term objective of this new Standard will be to consolidate rules and be the essential resource for overpressure protection.
Section XIII – Rules for Overpressure Protection

Not in Scope

- Rules of Application remain with the equipment Codes
  - Type of device
  - Number of devices
  - Overpressure
  - Required Relieving Capacity
  - i.e. - PG-67
- Conformity Assessment (CA-1)
  - Quality Programs
Section XIII – Rules for Overpressure Protection

Scope

- Content drawn from existing ASME Standards
  - BPV Sections I, III, IV, VIII, X and XII
  - PTC 25
- Rules for Pressure Relief Devices
  - Materials
  - Design
  - Construction
  - Testing
  - Settings
  - Capacity Certification
  - Performance Testing
  - Installation Requirements
Section XIII – Rules for Overpressure Protection

Scope

- Other pressurized equipment
  - Piping
  - Rotating Equipment
  - Low Pressure Vessels (< 15 psi)
  - Vacuum Protection

- Rules of OPP System Design
  - Guidance on elements of a system design
  - Not rules for the detail design of OPP systems
  - UG-140

- Future Scope Potential (Rules or Reference to Existing Standards)
  - Design Rules for PRDs
  - Material requirements more appropriate for PRDs
  - In-Service & Maintenance Rules
  - Broader Application Rules or Guidelines
Section XIII – Rules for Overpressure Protection

Stakeholders/Users

- BPV Standards Committees
- BPV Certificate Holders
- Other Sections and Divisions of the BPV Code, Piping Codes and other National and International Standards/Regulations/Directives
- International PRD manufacturers that are not ASME certificate holders
- PRD manufacturers of non-ASME certification marked devices
  - < 15 psig including vacuum
- Users including
  - Jurisdictions
  - Equipment owners/operators including their engineering staffs
  - Engineering/Design Firms
  - Relief device repair organizations
  - Insurance and inspection agencies
Section XIII – Rules for Overpressure Protection

OPP Standards Committee Membership

- Users
- Regulatory
- Manufacturers
- Construction Book Members Including Nuclear
- Materials
- International Representation
- Piping
- Testing Labs
Section XIII – Rules for Overpressure Protection

Jurisdictional and Legal Impact

• No expected impact to Jurisdictional requirements

• Application of XIII rules invoked by Construction Code
Section XIII – Rules for Overpressure Protection

Expected Benefits

- Elevates the technology to same level as protected equipment
- Increase understanding and knowledge
- Streamlines process of change and innovation
- Efficient use of ASME/Volunteer resources
- Aligns with Standards Evolution and Modernization Efforts
- Regains ASME Global Leadership

ENHANCES PUBLIC SAFETY
Section XIII – Rules for Overpressure Protection

Vision

• Consolidation and Standardization
• Comprehensive Resource
  – Pressure Relief Devices
  – Pressurized Equipment
  – OPP Systems
• Uniformity
• Global Relevance

THE ESSENTIAL RESOURCE for OVERPRESSURE PROTECTION
Questions and Discussion