



Reply to the attention of:

JUN 5 2015

MEMORANDUM FOR: REGIONAL ADMINISTRATORS  
THROUGH: *Theresa Clark for*  
DOROTHY DOUGHERTY  
Deputy Assistant Secretary  
FROM: *Pat J. Ugnat*  
THOMAS M. GALASSI, Director  
*For* Directorate of Enforcement Programs  
SUBJECT: RAGAGEP in Process Safety Management Enforcement

This memorandum provides guidance on the enforcement of the Process Safety Management (PSM) Standard's recognized and generally accepted good engineering practices (RAGAGEP) requirements, including how to interpret "shall" and "should" language in published codes, standards, published technical reports, recommended practices (RP) or similar documents, and on the use of internal employer documents as RAGAGEP. Enforcement activity, including the *Petroleum Refinery Process Safety Management National Emphasis Program* (Refinery NEP), and requests for assistance from the field, revealed the need for guidance on the PSM standard's RAGAGEP provisions.

#### Background on Recognized and Generally Accepted Good Engineering Practices

The PSM Standard, 29 CFR 1910.119, directly references or implies the use of RAGAGEP in three provisions:

- **(d)(3)(ii):** Employers must document that all **equipment** in PSM-covered processes complies with RAGAGEP;
- **(j)(4)(ii):** **Inspections and tests** are performed on process equipment subject to the standard's mechanical integrity requirements in accordance with RAGAGEP; and
- **(j)(4)(iii):** Inspection and test **frequency** follows manufacturer's recommendations and good engineering practice, and more frequently if indicated by operating experience.

In addition, **(d)(3)(iii)** addresses situations where the design codes, standards, or practices used in the design and construction of existing equipment are no longer in general use.

The PSM standard does not define RAGAGEP. However, the Refinery National Emphasis Program (CPL 03-00-010) references the definition found in the Center for Chemical Process Safety's (CCPS) *Guidelines for Mechanical Integrity Systems*:

"Recognized And Generally Accepted Good Engineering Practices" (RAGAGEP) – are the basis for engineering, operation, or maintenance activities and are themselves based on established codes, standards, published technical reports or recommended practices

(RP) or similar documents. RAGAGEP detail generally approved ways to perform specific engineering, inspection or mechanical integrity activities, such as fabricating a vessel, inspecting a storage tank, or servicing a relief valve.

As used in the PSM standard, RAGAGEP apply to process equipment design, installation, operation, and maintenance; inspection and test practices; and inspection and test frequencies. RAGAGEP must be both “recognized and generally accepted” *and* “good engineering” practices.

The PSM standard allows employers to select the RAGAGEP they apply in their covered processes.

### **Primary Sources of RAGAGEP**

#### **1. Published and widely adopted codes**

Certain consensus standards have been widely adopted by federal, state, or municipal jurisdictions. For example, many state and municipal building and other codes incorporate or adopt codes such as the National Fire Protection Association (NFPA) 101 *Life Safety* and NFPA 70 *National Electric* codes. Such published and widely accepted codes are generally accepted by OSHA as RAGAGEP, as are Federal, state, and municipal laws and regulations serving the same purposes.

#### **2. Published consensus documents**

Certain organizations like the American Society of Mechanical Engineers (ASME) follow the American National Standards Institute’s (ANSI) *Essential Requirements: Due process requirements for American National Standards* (Essential Requirements) when publishing consensus standards and recommended practices. Under the ANSI and similar requirements, these organizations must demonstrate that they have diverse and broadly representative committee memberships. Examples of published consensus documents include the ASME B31.3 *Process Piping Code* and the International Institute of Ammonia Refrigeration’s (IIAR) ANSI/IIAR 2–2008 - *Equipment, Design, and Installation of Closed-Circuit Ammonia Mechanical Refrigerating Systems*. Published consensus documents are very widely used as RAGAGEP by those knowledgeable in the industry, and are accepted as RAGAGEP by OSHA.

#### **3. Published non-consensus documents**

Some industries publish non-consensus engineering documents using processes not conforming to ANSI’s Essential Requirements. For example, the Chlorine Institute’s (CI) “pamphlets” focus on chlorine and sodium hypochlorite (bleach) safety. Where applicable, the practices described in these documents are widely accepted as good practices and used in industries handling these materials. Similarly, CCPS publishes an extensive set of guideline books, some, but not all, of which deal with process equipment specific topics, e.g., the Design Institute for Emergency Relief Systems’ technology for reactive and multi-phase relief systems design<sup>1</sup>. Peer-reviewed technical articles

---

<sup>1</sup> Many CCPS publications deal with management system issues and do not address topics subject to RAGAGEP.

addressing specific hazards may also fall into this category and may be considered when published standards or recommended practices are not available or are not adequate to address specific hazards. OSHA may accept such materials as RAGAGEP where applicable and appropriate.

Note that 29 CFR 1910.119(j)(4)(iii) also recognizes applicable manufacturer's recommendations as potential sources of RAGAGEP.

### “Appropriate Internal Standards”

The preamble to the PSM standard recognizes that employers may develop internal standards for use within their facilities. The preamble states, in relevant part:

The phrase suggested by rulemaking participants: “recognized and generally accepted good engineering practices” is consistent with OSHA’s intent. The Agency also believes that this phrase would include **appropriate** internal standards of a facility . . .<sup>2</sup> [emphasis added].

The preamble, however, does not imply that employers may disregard applicable published RAGAGEP.<sup>3</sup> Internally developed standards must still represent “*recognized and generally accepted* good engineering practices.”

Facility internal standards can serve a number of legitimate purposes, including:

1. Translating the requirements of published RAGAGEP into detailed corporate or facility implementation programs and/or procedures.
2. Setting design, installation, maintenance, inspection, and testing requirements for unique processes, equipment, and hazards for which no published RAGAGEP exists.
3. Supplementing (or augmenting) published RAGAGEP that only partially or inadequately address the employer’s processes, occupancies, conditions, and hazards. In this situation OSHA (and often the publisher) expect employers/users to supplement the published RAGAGEP with their own applicable practices, protocols, and procedures to control hazards.<sup>4</sup>
4. Controlling hazards more effectively than the available codes, standards, or practices.
5. Addressing hazards when the codes and standards used for existing equipment are outdated and no longer describe good engineering practice.

---

<sup>2</sup> PSM preamble accessed at [http://www.osha.gov/pls/oshaweb/ovadisp.show\\_document?p\\_table=PREAMBLES&p\\_id=1041](http://www.osha.gov/pls/oshaweb/ovadisp.show_document?p_table=PREAMBLES&p_id=1041) on January 15, 2013.

<sup>3</sup> 29 CFR 1910.119 *Purpose*; 57 Fed. Reg. 6390.

<sup>4</sup> For example: ANSI/IIAR 2-2008 *Equipment, Design, and Installation of Closed-Circuit Ammonia Mechanical Refrigerating Systems* states, “This document is intended to serve as a standard for equipment, design and installation of closed circuit ammonia refrigerating systems. Additional requirements may be necessary because of particular circumstances, project specifications or other jurisdictional considerations. Note that this standard does not constitute a comprehensive detailed technical design manual and should not be used as such . . .” (pg. i).

Employers' internal standards must either meet or exceed the protective requirements of published RAGAGEP where such RAGAGEP exist. OSHA has rejected employer standards that deviated from published RAGAGEP where the deviations were less protective than the published requirements.

### **"Shall" and "Should" in RAGAGEP**

"Shall," "must," or similar language used in published RAGAGEP reflects the developer's view that the practice is a mandatory minimum requirement to control a hazard. Similarly, "shall not," "prohibited," or similar language references or describes unacceptable approaches or practices. If an employer deviates from "shall" or "shall not" requirements in the employer's adopted RAGAGEP (or applicable RAGAGEP if the employer has not specified RAGAGEP), OSHA will presume a violation.

Use of the term "should" or similar language in the RAGAGEP reflects an acceptable and preferred approach, in the view of the publishing group, to controlling a recognized hazard. If a selected RAGAGEP provision is applicable to the covered process or particular situation, OSHA presumes that employer compliance with the recommended approach is acceptable.

If an employer chooses to use an alternate approach to the one the published "should" RAGAGEP says applies, the CSHO should evaluate whether the employer has determined and documented that the alternate approach is at least as protective, or that the published RAGAGEP is not applicable to the employer's operation. In the absence of such documentation, the CSHO should examine documents, such as relevant process hazards analyses (PHAs) and management of change procedures (MOCs), to determine if the employer's approach is as protective as the published RAGAGEP and is a good engineering practice. This may require consultation with Regional resources or the OSHA National Office (see below).

"Should not" or similar language describes disfavored or less than fully protective practices. Following such disfavored practices is presumed to be violative.

For technical help, consult with your Regional PSM Coordinator, technical support engineer, or contact the PSM group at OSHA's Directorate of Enforcement Programs - Office of Chemical Process Safety and Enforcement Initiatives at 202-693-2341.

### **"Normative" and "Informative" Requirements.**

Published codes and consensus documents frequently contain appendices or annexes that provide supplemental information and/or requirements. The content of these appendices or annexes may be "normative" or "informative." "Normative" sections generally explain how to comply with the published code and/or consensus document requirements and may contain both "shall" and "should" language. As discussed above, "shall" denotes the developer's view that the normative statement is mandatory, while "should" indicates an acceptable or preferred approach. "Informative" sections generally provide background and reference information with respect to the published code and/or consensus document requirements but may also identify and/or address hazards or acceptable means of abatement. Again, for technical help, CSHOs should

consult their Regional PSM coordinator, technical support engineer, or the Office of Chemical Process Safety and Enforcement Initiatives.

### **Other Uses of RAGAGEP Materials in PSM**

Only the three sections of 1910.119 referenced above require compliance with RAGAGEP. However, RAGAGEP can also provide useful background and context, and can help CSHOs identify and document hazards and feasible means of abatement when reviewing other aspects of the employer's PSM program and covered equipment.

### **Enforcement considerations**

In accordance with 1910.119, employers select the RAGAGEP with which their equipment and procedures must comply. In evaluating RAGAGEP compliance, CSHOs should be aware of a number of potential issues:

1. There may be multiple RAGAGEP that apply to a specific process. For example, American Petroleum Institute (API), RP 520 *Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries Part II - Installation*, and International Standards Organization, Standard No. 4126-9, *Application and installation of safety devices*, are both RAGAGEP for relief valve installation and contain similar but not identical requirements. Both documents are protective and either is acceptable to OSHA.
2. Employers do not need to consider or comply with a RAGAGEP provision that is not applicable to their specific worksite conditions, situations, or applications.
3. Some employers apply RAGAGEP outside of their intended area of application, such as using ammonia refrigeration pressure vessel inspection recommended practices in a chemical plant or refinery process. Use of inapplicable RAGAGEP can result in poor hazard control and can be grounds for citations.
4. There may be cases where fully applicable RAGAGEP do not exist to control hazards in an employer's covered process. As discussed in "Appropriate Internal Standards", above, the employer's internal standards (guidance and procedures) are expected to address the process hazards. Whether the internal standards are adequately protective should be reviewed on a case-by-case basis.
5. An employer's internal standards may be more stringent than the relevant published RAGAGEP. More-stringent standards may be needed to adequately control hazards due to the unique characteristics of the employer's process. This should be documented. Employers that meet published RAGAGEP requirements, but that fail to comply with their own more stringent internal requirements, may be citable under other PSM provisions:
  - If there is a failure to follow more stringent internal Inspection & Test (I&T) procedures, consider citations under 1910.119(j)(2) for failure to implement their written I&T procedures

- Process equipment may be outside acceptable limits defined in the employer's PSI. If so, consider citations under 1910.119(j)(5).
  - Additional or more stringent equipment safeguards may be specified by employers based on findings and recommendations from PHAs and supporting documents, such as Layers of Protection Analyses, siting studies, human factors studies, Quantitative Risk Assessments, and similar risk management activities, as well as Incident Investigations, or Management of Change procedures. Failure to implement or complete documented actions-to-be-taken may be cited under the relevant section of the Standard (e.g., 1910.119(e), (l), or (m)).
6. Selectively applying individual provisions from multiple RAGAGEP addressing similar hazards might be inappropriate. Standard writing organizations develop their requirements as packages and mixing-and-matching provisions from multiple sources could result in inadequately controlled hazards. This situation should be evaluated on a case-by-case basis. Consult the regional PSM Coordinator, regional engineering support, or the Office of Chemical Process Safety and Enforcement Initiatives if you are uncertain how to proceed.
  7. The PSM standard requires employers to document that their inspection and testing of equipment, required under 1910.119(j)(4)(ii) and (iii), is in accordance with their selected RAGAGEP, (e.g., as referenced in the written procedures required by 1910.119(j)(2)). Failure to do so is citable.
  8. In accordance with 1910.119(d)(3)(ii), employers must document that their covered process equipment and equipment whose operation could affect that process equipment comply with RAGAGEP (equipment built to older standards may come under 1910.119(d)(3)(iii), see paragraph 9 below). Equipment that does not comply with RAGAGEP cannot be documented as compliant. Therefore, both the failure to document compliance and the deviations from compliance with RAGAGEP can be cited under (d)(3)(ii).

When writing 1910.119(d)(3)(ii) RAGAGEP-related citations, always cite the employer for **failing to document** compliance with recognized and generally accepted good engineering practices, describe the hazard, e.g., exposure of employees to fire, explosion, or toxic hazards, and reference the RAGAGEP selected by the employer. If the employer has not specified an applicable RAGAGEP, use "such as" language to reference an applicable published RAGAGEP.

9. Equipment covered under PSM's Mechanical Integrity provisions (listed in 1910.119(j)) that is outside acceptable limits, as defined by the process safety information (including RAGAGEP), is deficient under 1910.119(j)(5). Employers are required by this provision to correct deficiencies before further use or in a safe and timely manner when necessary means are taken to assure safe operation in the interim. If an employer fails to correct the deficiency before further use, or fails to implement adequate interim measures and to schedule a permanent correction timely, the failure may be cited under 1910.119(j)(5). If an employer has implemented interim measures and scheduled correction, additional investigation may be required to determine whether the interim measures are adequate and the scheduled correction is timely. 1910.119(d)(3)(ii) and (j)(5) citations are often grouped. Consult your

Regional OSHA support staff and/or SOL if you are uncertain if grouped citations are appropriate.

Note, in the case where an employer is operating deficient equipment based on the use of interim safeguards pending final correction of the deficiency, 29 CFR 1910.119(l) requires that the employer develop and implement a management-of-change procedure for the continued safe operation of the equipment.

10. Older covered equipment may not have been designed and constructed under an applicable RAGAGEP because none existed at the time of design and construction. Alternatively, the equipment may have been designed and constructed under provisions of codes, standards, or practices that are no longer in general use. In such cases, 29 CFR 1910.119(d)(3)(iii) requires employers to determine and document that the equipment is designed, maintained, inspected, tested, and operating in a safe manner. Failure to do so may be cited under 1910.119(d)(3)(iii).

When writing 1910.119(d)(3)(iii) citations, always cite the employer for **failing to determine and document** that the relevant equipment design, maintenance, inspection and testing, and/or operation ensure the safety of the equipment.

If the employer has adopted an appropriate internal standard applicable to such older equipment, 29 CFR 1910.119(d)(3)(ii) requires the employer to document that the equipment complies with the internal standard. Failure to do so may result in a citation under 29 CFR 1910.119(d)(3)(ii).

11. When a 29 CFR 1910.119(d)(3)(ii) or (iii) citation is under consideration, it is important to establish and to document the age and installation date of the relevant process and equipment, and the dates and extent of process and equipment modifications, as well as the exact RAGAGEP selected by the employer, including the edition and publication date.
12. Organizations that publish RAGAGEP may update them based on newly identified or recognized hazards; improved understanding of existing hazards; industry operating experience; and/or incidents indicating that more stringent hazard control is needed. If the updated RAGAGEP explicitly provides that new clauses or requirements are retroactive, OSHA expects employers that have selected that RAGAGEP to conform to those provisions. Where RAGAGEP are updated to be more protective but are not explicitly retroactive, PSM does not mandate that employers upgrade their equipment, facilities, or practices to meet current versions of their selected RAGAGEP. However, OSHA does expect employers to address issues raised by or identified in the updated RAGAGEP in accordance with 1910.119(d)(3)(iii) by determining and documenting that their equipment is designed, maintained, inspected, tested, and operating in a safe manner. This can be accomplished through a variety of approaches, such as but not limited to the PHA revalidation and management of change (MOC) processes, or through corporate monitoring and review of published standards. Citations for 29 CFR 1910.119(d)(3)(iii), either stand-alone or grouped with, for example, (e)(3) or (l)(1), may be appropriate if the employer fails to address the issues (see item 8 above).

13. Notify the Office of Chemical Process Safety and Enforcement Initiatives if you encounter RAGAGEP that appear to have changed to be less protective or that are being interpreted by employers in a manner that is less protective. In the past, OSHA determined that specific provisions in published guidance documents were not RAGAGEP (i.e., OSHA believed that some written practices provided inadequate protection and were not good engineering practices; therefore, the specific practices in question could not be RAGAGEP). Such determinations should only be made in consultation with the Office of Chemical Process Safety and Enforcement Initiatives.
14. When writing 1910.119(j)(4)(ii) citations, always cite the employer for failing to follow RAGAGEP in its inspection and testing procedures, and reference the relevant RAGAGEP adopted / recognized by the employer. If the employer has not specified an applicable RAGAGEP, use “such as” language to reference an applicable published RAGAGEP. When the employer’s I&T procedures comply with RAGAGEP, but are not implemented or followed, consider 1910.119(j)(2) citations.
15. When writing 1910.119(j)(4)(iii) citations, always cite the employer for not inspecting and/or testing process equipment at frequencies **consistent** with applicable manufacturers’ recommendations and good engineering practices, **or more frequently** if indicated by prior operating experience, i.e., based on the condition of the equipment when previously inspected or tested.
16. When writing RAGAGEP-related citations when the employer has not specified a RAGAGEP, CSHOs should be careful to reference in the citation’s alleged violation description only RAGAGEP that are actually applicable to the equipment and process being inspected. CSHOs have sometimes referenced inapplicable API relief valve RAGAGEP in citations involving ammonia refrigeration processes.