

RAGAGEP – OSHA Wants Me to Do What??

2018 OSHA Oil & Gas Safety and Health Conference

Hilton Americas - Houston, TX

December 4-5, 2018

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RAGA – What?

***Recognized
And
Generally
Accepted
Good
Engineering
Practices***

- 1910.119(d)(3)(i)(F)
 - Codes/standards employed
- 1910.119(d)(3)(ii)
 - Compliance w/RAGAGEP
- 1910.119(d)(3)(iii)
 - Older Equipment Safe
- 1910.119(j)(4)(ii)
 - I/T follows RAGAGEP
- 1910.119(j)(4)(iii)
 - I/T frequency

Overview

1. Discuss the RAGAGEP concept and how it fits into the process safety lifecycle
2. Identify the PSM sub-elements relevant to RAGAGEP enforcement
3. Identify major sources of RAGAGEP
4. Putting it all together – how RAGAGEP works in your facility
5. Some real-life RAGAGEP violations

Central PSM Standard Concept

- OSHA's PSM Standard is a “performance” standard
- Employers have lots of **latitude** to perform compliance under PSM
- However, there is also a responsibility to be able to **demonstrate performance/compliance**
- RAGAGEP requirements give ER significant latitude but they also require demonstration of their performance that they have complied with RAGAGEP.

SMS and RAGAGEP

- Do you have a solid safety management system?

Say what you do

(Identify, write it down, and commit to it)

Do what you say

(Implement/Execute)

- If you do, you have **implemented RAGAGEP**

RAGAGEP Starting Point

- This is **IMPORTANT**

EMPLOYERS CHOOSE RAGAGEP!!!

Not ALL RAGAGEP are in play



**Only those RAGAGEP that are
APPLICABLE to the specific worksite
application**

Why Did OSHA Come Out This “New” RAGAGEP Rule?

- There is NO new RAGAGEP rule or standard
- Included in original PSM rule in 1992
- First RAGAGEP interpretation issued in 2000.
 - Compliance with PSM and ANSI/ISA-S84.01 for safety instrumented systems

What Did OSHA Say About RAGAGEP in the 2000 LOI?

- **1910.119(d)(3)(i)(F)** requires an employer to document which design codes and standards are used for SIS **[Insert your equipment that is part of process]**
- **1910.119(d)(3)(ii)** requires an employer to document that SIS **[Insert your equipment that is part of process]** comply with RAGAGEP
- When not specified, the employer has flexibility in complying with the requirements of PSM, including RAGAGEP.
- With respect to SIS **[Insert your equipment that is part of process]**, OSHA does not specify or benchmark S84.01 as the only RAGAGEP.

RAGAGEP Guidance

Revised RA Memo

- On May 11, 2016, OSHA published a **revised** RAGAGEP enforcement policy
 - Modifies the RA Memo of June 5, 2015
 - Language less specific, and includes references desired by industry
 - Links to the memo available at [RAGAGEP](https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=30785)
https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=30785

RA Memo – Sources of RAGAGEP

- Codes (e.g., ASME B&PV Code, NFPA-70, the NEC, IBC, &etc.)
- Consensus recommended practices and standards (e.g., NFPA 30, API 752, IIAR-2)
- Published non-consensus - typically narrower in scope (e.g., Chlorine Institute pamphlets, DIERS, technical papers on specific hazards)

RAGAGEP Background

- ***Two PSM Elements Reference RAGAGEP***
 - 1910.119(d) Process Safety Information
 - For the design of **all** process equipment
 - 1910.119(j) Mechanical Integrity
 - For inspection and test (I&T) methods and frequency for equipment covered under (j)(1)
- Among the most frequently cited PSM violations!

RAGAGEP – Process Safety Information (PSI)

(d)(3)(i)(F) – document design codes and standards used

(d)(3)(ii) – document that process equipment complies with RAGAGEP

(d)(3)(iii) – determine and document that existing equipment built to out-of-use standards is safe

RAGAGEP – PSI

(d)(3)(i)(F)

(d)(3)(i)(F) -The employer shall develop and maintain a compilation of written safety information...information pertaining to the equipment in the process shall include...**design codes and standards employed.**

Say what you do

RAGAGEP – PSI

(d)(3)(ii)

(d)(3)(ii) - The employer shall document that **equipment complies** with recognized and generally accepted good engineering practices

- The **employer** (**not OSHA!**) **selects** the applicable and protective RAGAGEP it will use / comply with!

RAGAGEP – PSI

(d)(3)(ii)

- PSI requirements relate to **equipment** in covered processes
 - Equipment must actually comply with RAGAGEP for the employer to document compliance
 - More than just a documentation requirement, **also requires implementation - Do what you say**
 - **Simple concept** - You can't document what you haven't done.

RAGAGEP – PSI

(d)(3)(iii)

(d)(3)(iii) - For existing equipment designed and constructed in accordance with codes, standards, or practices that are no longer in general use, the **employer shall determine and document** that the **equipment is** designed, maintained, inspected, tested, and operating in a **safe manner**

RAGAGEP – Process Safety Information

(d)(3)(iii)

- RAGAGEP can change over time:
 - ASME Code pressure vessel safety factors (reduced due to better alloys, inspection methods)
 - API 510 and 570: Vessel and Piping Inspection Codes
 - API RP 2219 Safe Vacuum Trucks Petroleum Service (1999 ed. changed in 2005)
 - Major changes after BLSR 3 worker fatality vapor cloud fire in Rosharon, TX (2003)

RAGAGEP – Process Safety Information

(d)(3)(iii)

- OSHA **cannot** require employers to update their equipment to current RAGAGEP unless the RAGAGEP is explicitly retroactive
- The employer is required to determine and document that its process equipment is safe
- OSHA expects employers to consider relevant changes in RAGAGEP as part of the risk management activities

RAGAGEP – Mechanical Integrity

(j)(4)(ii)

(j)(4)(ii) - Inspection and testing practices shall follow RAGAGEP

- There are published standards/practices for inspecting most PSM/MI covered equipment
- **Are your (j)(2) – MI procedures grounded in appropriate MI RAGAGEP?**
 - (j)(2) – MI's **Say What you do – Do what you say**

RAGAGEP – Mechanical Integrity

(j)(4)(ii)

- Intended to ensure that deficiencies in process equipment subject to mechanical integrity requirements are detected **before** failure
- OSHA typically expects employers to update their inspection and test practices within a reasonable time period (not fixed) when RAGAGEP is changed/upgraded

How long has it been since you looked at API 510 and 570?

RAGAGEP – Mechanical Integrity

(j)(4)(iii)

(j)(4)(iii) - The **frequency** of inspections and tests of process equipment shall be consistent with applicable **manufacturer's recommendations and good engineering practices**, *and more frequently* if determined to be necessary by prior operating experience.

RAGAGEP – Mechanical Integrity

(j)(4)(iii)

- I&T must be performed MORE FREQUENTLY when operating experience shows it is necessary
 - Relief valves are found to be fouled or corroded at their normal I/T interval
 - Piping or pressure vessel corrosion is found to be **faster** or **more variable** than expected

RAGAGEP Guidance

Revised RA Memo – Determining RAGAGEP

- Several sections of the revised memo direct CSHOs to determine if an **internally developed** Employer standard is RAGAGEP:
 - When the internally developed standard is less protective than published codes, standards, or practices
 - When the ER does not follow “should” or “should not” language in published codes, standards, or practices, but rather uses alternate approaches to control hazards

RAGAGEP Guidance

Revised RA Memo – Determining RAGAGEP

- If internal standards are consistent with commonly used published documents, they are likely acceptable
- CSHOs must thoroughly document problematic/deficient ER internal standards:
 - External RAGAGEP referenced, if any
 - Deviations that appear to be less protective than appropriate RAGAGEP and do not adequately control the associated hazards
 - Evidence that the ER has implemented / is following their internal standard (exposure)
 - Risk management documents (e.g., PHA, studies)

“Shall” Language in RAGAGEP

- Mandatory minimum requirement
- Failure to follow is presumed to be violative
- Alternate approaches claimed to be equally protective must be documented as such and should be evaluated on a case-by-case
- Consult regional engineering support or the OCPSEI in the National Office

“Shall” Language in RAGAGEP

- ER claims that alternate approaches are necessary or superior need careful review and must be well supported
 - This may require review of PHAs and a detailed comparison of company and published standards relevant to the hazard(s) being addressed.

“Should” Language in RAGAGEP

- Identifies an acceptable and preferred approach to controlling hazards
- *If applicable to the employer’s process & equipment, compliance is acceptable to OSHA (assumes implementation)*
- Alternate approaches may be acceptable if they are RAGAGEP

“Should” Language in RAGAGEP

- Focus on control of the hazard!
- Substitution of administrative controls for engineering controls is a red flag – these are unlikely to be deemed RAGAGEP
- The employer does not have to justify deviation from “should” statements, but still must document compliance with RAGAGEP



“Should” Language in RAGAGEP

- When evaluating compliance, look to alternate published sources of guidance
- IF the employer has done a competent LOPA or QRA and/or they have implemented adequate controls to control the hazard they are likely OK
- These situations are case-by-case
- Consult Region &/or OCPSEI!

Putting It All Together Equipment Design

- Gas Plant XYZ designed and installed a pressure vessel - PV 123.
 - Employer has PSI that shows (**demonstrates**) that they design all pressure vessels at the facility to ASME BPVC, Section VIII, Division 1 (**A RAGAGEP for PV design and construction**)
 - Compliance with 119(d)(3)(i)(F) – design codes and standards employed for design/install of pressure vessels

Say what you do

Putting It All Together (con't)

RAGAGEP PV Compliance

- The ER has documentation that demonstrates that the design and installation of PV 123 complies with RAGAGEP
 - 119(d)(3)(ii) – PV 123 complies with RAGAGEP

The employer can **demonstrate** it has **performed** to the 119(d)(3)(ii) RAGAGEP requirement

Do what you say

Putting It All Together (con't)

RAGAGEP RV Non-Compliance

- However, upon inspection of the PV 123 relief valve (RV 123) the CSHO finds it to be undersized based on the design capacity.
- Employer's engineering specifications state relief valves are to be designed/installed per API 520/521 (Employer's chosen RAGAGEP)
 - 119(d)(3)(i)(F) – design codes and standards employed for pressure relief design

Say what you do

– But.....

Putting It All Together (con't)

RAGAGEP RV Non-Compliance

- RV 123's actual capacity is less than required per the design
 - Design based on API 520/521
 - API 520/521 was chosen as the RV design/install RAGAGEP by the ER
 - The actual (**implemented**) RV did not meet RAGAGEP
 - **Non**-compliance: 119(d)(3)(ii)

Did not do what you say

Putting It All Together (con't)

RAGAGEP & Equipment I/T

- PV 789 has been in-service for 2 years
 - Relative corrosive service
 - ER's MI procedure for inspecting PVs in “process” service is every 5 years
 - PV 789 was **not** inspected at the time it was installed.
- **The good news**, the ER has an MI procedure for inspecting PVs and it does include PV inspection frequencies

Putting It All Together (con't)

RAGAGEP Inspection Frequency

- **The Bad News** – While the ER's procedure includes an inspection frequency that has yet to be reached, the inspection frequency does not follow RAGAGEP because it is **silent on installation inspections**.
 - Much of ER's PV inspection procedure follows API 510 (Pressure Vessel Inspection Code)
 - API 510 (2014) Section 6.2.1.1 requires PVs to be inspected by an inspector at the time of installation.

This was not included so it wasn't done

Make sure you say enough

Putting It All Together (con't)

RAGAGEP Inspection Frequency (con't)

- A gas plant is much like a chemical plant making API 510 an appropriate RAGAGEP to follow for this facility.
- Further, API 510 (2014) Section 6.2.1.1.c requires that inspectors **verify** PRDs/RVs satisfy design requirements (correct device and correct set pressure) and are properly installed during this **installation inspection**.
 - RAGAGEP **Non**-compliance: **119(j)(4)(ii)**
Make sure you say the right thing
 - 119(j)(6)(ii) – Checks on installation of RV

Some Real-life RAGAGEP Violations

- 1910.119(d)(3)(ii) Comply w/RAGAGEP

The employer did not document that the **Control Room, Administrative, and Instrumentation and Electronics buildings**, comply with RAGAGEP, such as, but not limited to, **API 752 Facility Siting for Permanent Buildings Sections**; thereby **allowing employees to occupy inadequately protected structures exposed to explosion, fire, toxic material, or high pressure hazards** resulting from the release of highly hazardous chemicals from process equipment.

Some Real-life RAGAGEP Violations

- 1910.119(d)(3)(ii) Comply w/RAGAGEP

The employer does not ensure it documented that equipment in the process complied with RAGAGEP: The violation occurred in the XXXX Gas Plant on or about March 6, 2013 and times prior to where the **employer failed to ensure administrative controls were in place to manage intervening block valve(s) to/from relief devices to ensure they were open during operation in accordance with ASME Boiler and Pressure Vessel Code, Division 1, Section VIII.** Identified relief devices include but are not limited to PSV-1842 (T-186) and PSV-2001 (PV-2001). This condition exposed employees to fire and explosion hazards.

Some Real-life RAGAGEP Violations

- 1910.119(d)(3)(ii) Comply w/RAGAGEP

The employer does not ensure that equipment in the process complies with RAGAGEP: The violation occurred in the YYYYYY Facility on or about October 9, 2014 and at times prior thereto where the **employer failed to ensure car seals on block/stop valves of relief devices complied with the ASME BPVC, Section VIII** for the flowing pressure relief valves such as but not limited to:

1. Block valve for PSV-IA1 on P&ID SPR-MO-1-701 Rev. 3
2. Block Valve for PSV- IA3 on P&ID SPR-MO-1-701 Rev.

This condition exposed employees to inhalation, fire, and explosion hazards from releases of hazardous materials.

Some Real-life RAGAGEP Violations

- 1910.119(j)(4)(ii) I/T procedures follow RAGAGEP
On or about 04/18/2016, at the XXXX Producer Services LLC located in YYYY State, the employer did not document that it complied with RAGAGEP such as API Standard 510 (Pressure Vessel Code: In-service Inspection, Rating, Repair, and Alteration) when it **failed to establish, then implement and have readily available an inspection plan and strategy which addressed items such as but not limited to, performing internal inspections of a pressure vessel**, Demethanizer MAF-214.

Some Real-life RAGAGEP Violations

- 1910.119(j)(4)(ii) I/T procedures follow RAGAGEP

The employer does not **ensure inspections and tests performed** to maintain the on-going mechanical integrity of process equipment **followed RAGAGEP**. The violation occurred in the XXXX Gas Plant on or about October 9, 2014 and at times prior thereto. Employees were exposed to fire and explosion hazards when the employer **failed to ensure inspections and tests were performed on process equipment pressure relief valves/devices in accordance with RAGAGEP such as API 510 & 576**. Identified relief valves/devices include but not limited to:

- a. PSV 62 01 (Discharge Scrubber North)
- b. PSV 1-68 (Reflux Accumulator) **[6 other PSVs cited]**

Some Real-life RAGAGEP Violations

- 1910.119(j)(4)(iii) – I/T frequency

The employer does not ensure the frequency of inspections and tests performed on process equipment to maintain its on-going mechanical integrity followed RAGAEP: A. The violation occurred in the Fractionation Plant on or about April 17, 2014 and times prior thereto where employees were exposed to fire and explosion hazards when **the employer failed to ensure that the frequency of inspections and tests were performed on process equipment and piping in accordance with RAGAGEP such as API 570 and the employer's mechanical integrity program.** Identified process piping include but are not limited to: XX, YY

Some Real-life RAGAGEP Violations

- 1910.119(j)(4)(iii) – I/T frequency

The employer did not ensure the frequency of inspections and tests were followed. A. The violation occurred in the Gas Processing/NRU Facility on or about March 18, 2014 and times prior thereto where the employer **failed to ensure the frequency of testing and inspections of safety instrumented systems were conducted in accordance with the safety integrity level analysis and the employer's mechanical integrity program:**

- a. Interlock/SIS 326
- b. Interlock/SIS 329
- c. Interlock/SIS 100

Implementation

Plans and procedures can be solid, but....

Most incidents due to failure to

EXECUTE and **MAINTAIN**

Say what you do...do what you say



The Safety Car

- **Front Seaters**

- Employers have work
- Workers have their

WORKERS

OSHA, STEPS, et al



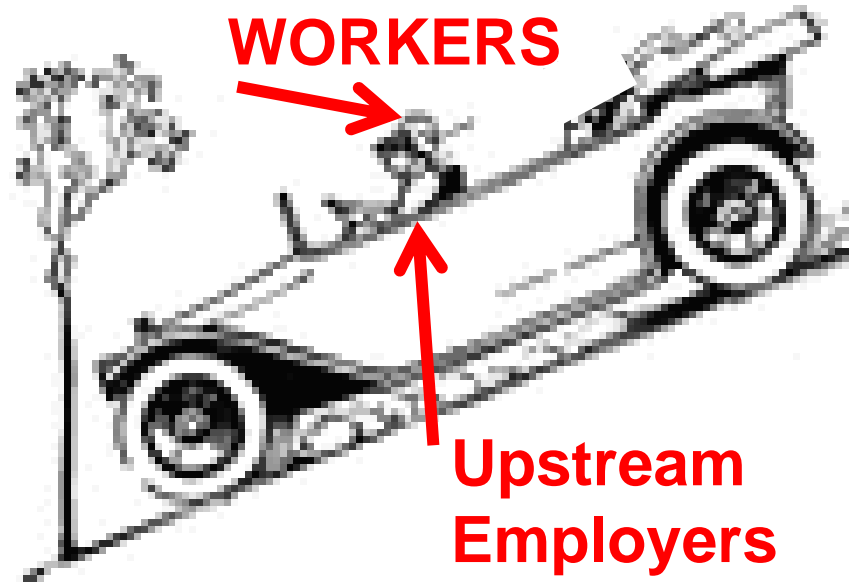
Upstream
Employers

- **Back Seaters**

- Regulators (OSHA, EPA)
- Associations – API
- Networks - STEPS
- Others (Insurance, Comp

- It's a **SYSTEM** – We're all in **SAFETY** together!!!

WORKERS



Upstream
Employers

Thank You!

ANY QUESTIONS?

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