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## Navigating the RAGAGEP Maze - Highlights

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# Dr. Georges A. Melhem



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- ▶ Over 25 years of Engineering and Process Safety Experience
- ▶ Technical Expertise included:
  - ▶ Pressure Relief and Flare Systems Design
  - ▶ Chemical Reaction Systems
  - ▶ Fire and Explosion Dynamics
  - ▶ Quantitative Risk Analysis
  - ▶ LNG Safety
  - ▶ Process Safety Management
  - ▶ Litigation Support

# PSM compliance requires careful consideration and understanding of its legal framework

- ▶ Performance based
- ▶ What is really covered?
- ▶ Continuing evolution of RAGAGEP
- ▶ General duty clause
- ▶ When does non-compliance become a violation and/or continues to be a violation?
- ▶ Interim risk reduction measures and definition of “timely manner”

Also see: Cunio and Melhem, “A Guide to the legal framework of the PSM Standard for Engineers”, Process Safety Progress, Vol. 33, No. 2, June 2014

# PSM compliance is a long and drawn-out exercise and requires discipline and deep expertise

- ▶ Create and maintain a robust, compliant PSM program
- ▶ Address PSM violations identified through audits (1st, 2nd, and 3rd party)
- ▶ Ensure efficient and effective corrective action
- ▶ Consider PSM during due diligence performed in connection with mergers and acquisitions
- ▶ PSI, PHA, and MI elements resulted in the majority of OSHA citations under the Petroleum Refinery (>50%) and Chemical (>60%) PSM National Emphasis Programs

# 10th Circuit Ruling on Expanding PSM Coverage



## Message To Our Valued Clients

Dear Georges,

On October 27, 2020, the United States Court of Appeals 10th circuit handed down a decision on interconnectivity of equipment as it pertains to OSHA Process Safety Management Standard 1910.119 in a case Eugene Scalia, Secretary Of Labor vs. Wynnewood Refining Co., LLC and Occupational Safety & Health Review Commission.

**Court Decision** ([Read it here](#)): Ruled that a boiler was part of the covered process, although it did not contain any highly hazardous chemicals, because it was connected to the process. An indirect physical link between the boiler and the covered units was deemed sufficient for PSM coverage.

**The Determination:** Was made based on the *definition* of “covered process” comprising of two sentences:

*“Process means any activity involving a highly hazardous chemical including any use, storage, manufacturing, handling, or the on-site movement of such chemicals, or combination of these activities. For purpose of this definition, any group of vessels that are interconnected and separate vessels which are located such that a highly hazardous chemical could be involved in a potential release shall be considered a single process.”*

The court decision focused on the second sentence of this definition ruling that the modifier *“such that a highly hazardous chemical could be involved in a potential release shall be considered a single process”* does not apply to *“any group of vessels that are interconnected”* but only to *“separate vessels which are located”*.

## What Does This Mean to the Industry?

**Far-reaching** – As it rules that any equipment interconnected to a covered process is automatically part of the covered process and DOES NOT have to contain highly hazardous chemicals. If it’s connected – it’s covered.

This can expand the PSM coverage in facilities to include not only connected utilities such as boilers providing steam, cooling towers, nitrogen generation units to the process, etc. but also downstream or upstream operations. Such as, interconnected vessels or manufacturer skids, which were previously not considered to be PSM covered with no potential release of a highly hazardous chemical.

## What Does This Mean to You?

**Process Hazard Analysis studies** at your facility may have to be expanded. Mechanical/Asset Integrity programs may require the inclusion of additional assets and various types of Process Safety Information, such as relief and flare systems design documentation, or facility siting studies, may need to be updated to meet Recognized and Generally Accepted Good Engineering Practices (RAGAGEP).

## How We Can Help

As **ISO certified** process safety experts, we can assist you with all areas of Process Safety Management (PSM) implementation, interpretation, and compliance. We can help you understand if this ruling affects your facility, and how you are affected. We can then develop a compliance plan to assist you in addressing the requirements of this ruling and to successfully demonstrate your compliance with the OSHA PSM Standard. [Contact us today.](#)



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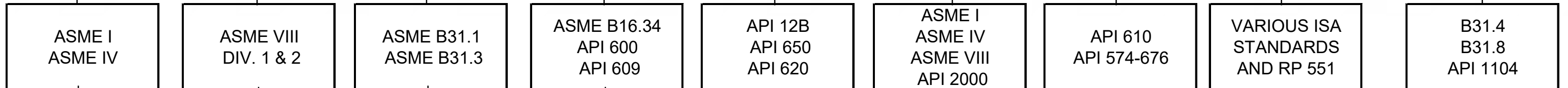
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# Compliance with standards and RAGAGEP can be resource intensive and costly

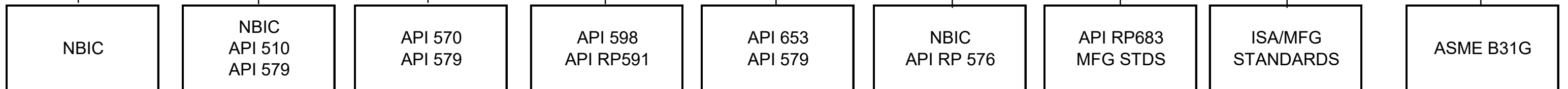
## 1. ITEMS:



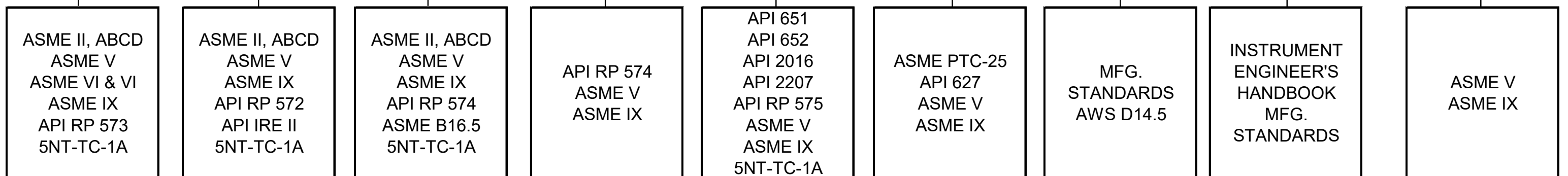
## 2. DESIGN OR CONSTRUCTION CODES:



## 3. INSPECTION, REPAIR, ALTERATION, RERATING, OR FITNESS FOR SERVICE CODES:



## 4. "SUPPORT" OR "REFERENCED" CODES OR PUBLICATIONS:



1: Guidelines for Mechanical Integrity Systems – CCPS Publication

# RAGAGEP categories requiring special attention in relief systems include but are not limited to..

- ▶ Dispersion analysis (safe discharge location)
- ▶ Thermal radiation (safe discharge location)
- ▶ Vibration risk & noise
- ▶ Reaction forces and structural supports including slug flow
- ▶ Metal cold temperatures due to expansion cooling and two phase flow
- ▶ Hot temperatures due to fire exposure and/or runaway reactions
- ▶ PRV stability
- ▶ Reaction systems (SDS is not sufficient!)
- ▶ Loss of high pressure / low pressure interface

Also see: G. A. Melhem and C. Houston, "RAGAGEP Considerations for Relief and Flare Systems", Process Safety Progress, March 2016

# Dispersion analysis is required in order to have a PSM compliant documentation

- ▶ Flame outs (volatile emissions, flares behave like vent stacks)
- ▶ Two phase relief (sometimes caused by oversizing PRV)
- ▶ Liquid Rainout or flaming rain
- ▶ Condensation from hot hydrocarbon relief
- ▶ Touchdown can be further down from fence line
- ▶ Toxicity, flammability, and overpressure considerations
- ▶ Stack downwash
- ▶ Low flow and velocity leading to poor dispersion
- ▶ Environmental impact



# PRV stability issues continue to challenge regulatory agencies and operating companies

- ▶ BP vs. OSHA decision re 3 % and RAGAGEP
- ▶ Appeal of BP vs. OSHA decision and OSHA Enforcement Memorandum
- ▶ Questions on what constitutes “RAGAGEP”
- ▶ Emphasis on what constitutes a proper “Engineering Analysis”
- ▶ Emphasis on what “in a Timely Manner” means
- ▶ PERF-II project for PRV stability research
- ▶ Stable PRV installations are required/implied by ASME and API

# Because OSHA says something is RAGAGEP does not make it so

- ▶ August 2013 – 60 out of 65 BP Ohio refinery PSM citations (including 3 % IPL and RAGAGEP) were vacated after a month-long trial with 5 remaining reducing penalties from \$2,870,000 to \$35,000
- ▶ September 2018 – Five years after OSHA appealed the 2013 ruling, the OSHA review commission upheld the 2013 ruling
- ▶ A big win for industry regarding RAGAGEP because the 2018 ruling affirms that OSHA PSM is performance based and that OSHA cannot second guess an employer's discretion on how to comply
- ▶ Multiple RAGAGEPs can be used as long as employers show that they engaged in a deliberative process to come up with what they are applying and can show that they have a robust PSM program

# Between 2013 and 2018 OSHA issued two enforcement memorandums related to RAGAGEP

- ▶ First memorandum was published in June of 2015 making RAGAGEP requirements more stringent and more broadly applicable
- ▶ Legal challenges by industry trade associations in August 2015 and criticism by US senate in September of 2015 for OSHA's use of guidance outside rule making process with a request for OSHA to withdraw 2015 guidance document
- ▶ Second memorandum was issued May 2016 with several revisions agreed to by OSHA to resolve and settle the legal industry challenges
- ▶ The 2016 revision was a softened version of the 2015 memorandum and is consistent with the BP initial and appeal rulings

# Employer standards language was removed

2015 Memorandum	2016 Memorandum	Enforcement Implications
Employer standards “must either meet or exceed the protective requirements of published RAGAGEP”	Language removed	<ul style="list-style-type: none"><li data-bbox="2192 527 3142 664">▪ Employers can follow internal procedures</li><li data-bbox="2192 761 3142 971">▪ OSHA inspectors must assess whether these procedures represent RAGAGEP</li><li data-bbox="2192 1069 3142 1279">▪ May not be required to be as stringent as published standards in some cases</li><li data-bbox="2192 1376 3142 1513">▪ Leaves room for case-by-case and inconsistent interpretations</li></ul>

# The use of “should” vs. “shall” was clarified

2015 Memorandum	2016 Memorandum	Enforcement Implications
<p>Recommended statements (<i>i.e.</i> should) viewed as the “preferred approach;” Suggests documenting deviations from “should” statements</p>	<p>Clearly states employers can deviate from “should” statements; Notes that “an employer does not need to document deviations from a ‘should’ statement provided it documents that its equipment complies with RAGAGEP”</p>	<ul style="list-style-type: none"><li>▪ OSHA will not presume a violation if “should” provisions are not followed</li><li>▪ Less focus on preferred approaches, but reinforces requirement to document RAGAGEP being followed, whether it be a “should” statement or something else</li></ul>

# Mixing of RAGAGEP is possible

2015 Memorandum	2016 Memorandum	Enforcement Implications
Mixing-and-matching provisions from multiple sources may be inappropriate	“Internal standards that incorporate select provisions from different sources of RAGAGEP may in some circumstances be appropriate, or may be more protective than applying one source of RAGAGEP”	OSHA will evaluate mixed RAGAGEP on a case-by-case basis potentially leading to inconsistent interpretations

# There is no need to meet updated and more restrictive RAGAGEP unless updated RAGAGEP is explicitly retroactive

2015 Memorandum	2016 Memorandum	Enforcement Implications
Employers “expected” to conform with retroactive updates to a RAGAGEP document	Language softened and notes that “updates are relevant to determining whether the employer’s practice continues to conform to RAGAGEP”	<ul style="list-style-type: none"><li>• Upgrades are not required for RAGAGEP updates that may be more protective but are not explicitly retroactive</li><li>• Employers must still determine and document that equipment is safe to operate (regardless of changes to RAGAGEP)</li></ul>

► What about the General Duty clause?

# There are continuing RAGAGEP operational challenges

Issue	Strategy	Risks
Ensuring Safe Operation During Program Development	?	?
Documenting RAGAGEP	<ul style="list-style-type: none"> <li>▪ Matrices</li> <li>▪ Including references in procedures</li> <li>▪ Normative referencing</li> </ul>	<ul style="list-style-type: none"> <li>▪ Provides roadmap for agency inspectors (may not fully understand)</li> <li>▪ Internal standards</li> <li>▪ Compliance with multiple competing requirements</li> </ul>
<b>Documenting Deviations</b>	How can it be done?	<ul style="list-style-type: none"> <li>▪ Considerations when preparing internal policies</li> <li>▪ When your facility represents different conditions than what RAGAGEP was intended for</li> </ul>
Managing Changes to RAGAGEP	How to track?	?



# There are additional RAGAGEP risk factors that require evaluation for compliant relief systems documentation

- ▶ (d)(3)(ii) Employers must document that all equipment in PSM covered processes complies with RAGAGEP
  - ▶ Published and widely adopted codes
  - ▶ Published consensus documents
  - ▶ Published non-consensus documents
  - ▶ Corporate Standards and training documents
- ▶ Failure to document compliance and the deviations from compliance with RAGAGEP can be cited under (d)(3)(ii)
- ▶ OSHA definition of process equipment is very broad

# The PSM standard allows companies to select the RAGAGEP they can apply to their covered processes

- ▶ Performance based regulation
- ▶ There may be conflicting RAGAGEP or more than one applicable RAGAGEP
- ▶ “Say what you will do” and “do what you say”
- ▶ If internal standards are more stringent then they should be followed
- ▶ If internal standards or selected RAGAGEP do not adequately address the hazard to employees then the General Duty clause can be invoked by OSHA for citations for the residual hazards and/or risks

# Equipment outside acceptable limits (as defined by PSI) is deficient

- ▶ Deficiencies must be corrected before further use or interim safeguards must be established
- ▶ Interim safeguards must afford the same level of risk reduction as the permanent safeguards
- ▶ Interim safeguards require an MOC for continued safe operation
- ▶ Permanent safeguards must be completed in a timely manner
- ▶ What qualifies as “timely manner” ?

# What is the catch with RAGAGEP?

- ▶ Standards referenced in the PSM regulation are frozen in time. Notice and comment are required for rule-making for updating them
- ▶ RAGAGEP evolves over time and may become more stringent
- ▶ RAGAGEP may be binding without the necessity of rule-making and due process
- ▶ Similar to **Best Available Techniques Not Entailing Excessive Costs (BATNEEC)**. An approach to pollution control in the UK that requires operating companies to adopt the most effective techniques for an operation at the appropriate scale which are commercially available and where the benefits gained are more than the costs of obtaining them

# There are also many other challenges to consider in addition to RAGAGEP

- ▶ Regulatory revisions
- ▶ California/OSHA RAGAGEP requirements
- ▶ EPA RMP revisions
- ▶ Upcoming PSM revisions
- ▶ Implications of differing regulatory requirements

The woods are lovely, dark and deep, but I have promises to keep, and dots to connect before I sleep, and more dots to connect before I sleep..



# About ioMosaic Corporation

Through innovation and dedication to continual improvement, ioMosaic has become a leading provider of integrated process safety and risk management solutions. ioMosaic has expertise in a wide variety of areas, including pressure relief systems design, process safety management, expert litigation support, laboratory services, training, and software development.

ioMosaic offers integrated process safety and risk management services to help you manage and reduce episodic risk. Because when safety, efficiency, and compliance are improved, you can sleep better at night. Our extensive expertise allows us the flexibility, resources, and capabilities to determine what you need to reduce and manage episodic risk, maintain compliance, and prevent injuries and catastrophic incidents.

Our mission is to help you protect your people, plant, stakeholder value, and our planet.

For more information on ioMosaic, please visit: [www.ioMosaic.com](http://www.ioMosaic.com)