

The background of the image is a close-up of the American flag, showing the stars and stripes. The OSHA logo is prominently displayed in the center. The 'O' is a large, stylized circle with a blue outer ring and a white inner ring. The letters 'S', 'H', and 'A' are in a white, serif font. A registered trademark symbol (®) is located to the upper right of the 'A'.

**OSHA<sup>®</sup>**

**Occupational Safety  
and Health Administration**

# 2012 USW Health, Safety & Environment Conference

## OSHA's Refinery & Chemical National Emphasis Programs

The Westin Convention Center Pittsburgh

March 6, 2012

Mike Marshall, PE  
PSM Coordinator  
USDOL-OSHA, Directorate of Enforcement Programs



# *National Emphasis Programs*

- Provide for planned inspections in high hazard industries
- Focus efforts on specific hazards
- Refinery NEP focuses on implementation of PSM in Refineries
- Chemical NEP focuses on implementation of PSM in all other PSM covered facilities

# *NEP Purpose*

To control or eliminate workplace hazards associated with the release of highly hazardous chemicals (HHCs)

# *Comparison of Refinery and Chem NEPs to Prior PSM Inspections*

- NEPs are the most significant PSM enforcement actions since the standard was promulgated in 1992
- Significant differences between current effort and pre-2007 inspections:
  - 73% of early inspections were initiated due to accidents, complaints or referrals.
  - Almost all Refinery NEPs were program planned

# Comparison of Refinery and Chem NEPs to Prior PSM Inspections

- NEP inspections have more violations and higher penalties than prior PSM OR PQV inspections:

Type of PSM Inspection Program	Citations per Inspection	Penalty (\$) per Inspection
Refinery NEP	11.2	76,800
Chem NEP	8.4	31,600
PQV and other non-NEP inspections (Before 2007)	2.3	2,950

# *Refinery NEP*

- Originally launched June 7, 2007
- Last inspections completed in 2011
- Combined “static” and “dynamic” question lists with guidance for compliance officers (CSHOs)

# Refinery NEP

- Comprehensive
- Resource intensive for employers and OSHA
  - About 1,000 OSHA hours/inspection
- Compliance found to be highly uneven
- Average penalties/inspection = \$76,821
- Average penalty/violation = \$6,859
- Average violations/inspection = 11.2



# Refinery NEP Frequently Cited PSM Elements

<b>Element</b>	<b>Description</b>	<b>Number</b>	<b>Percent</b>
j	Mechanical Integrity	198	19.5%
d	Process Safety Information	177	17.4%
f	Operating Procedures	174	17.1%
e	Process Hazard Analysis	168	16.5%
l	Management of Change	92	9.0%
m	Incident Investigation	68	6.7%
h	Contractors	44	4.3%
o	Compliance Audits	41	4.0%
g	Training	29	2.9%
n	Emergency Planning & Response	14	1.4%
c	Employee Participation	12	1.2%

# Refinery NEP Frequently Cited PSM Sub-elements

<b><i>Sub-element</i></b>	<b><i>Description</i></b>	<b><i>Number</i></b>
119(d)(3)(ii)	Compliance w/ RAGAGEP	71
119(j)(5)	Correction of deficiencies	63
119(e)(5)	PHA findings not addressed	52
119(l)(1)	MOC not established/implemented	39
119(d)(3)(i)(B)	P&IDs missing / incorrect	37
119(j)(2)	No written MI procedures	38
119(e)(3)(v)	PHA facility siting	29
119(f)(4)	Safe work practices not established	29
119(j)(4)(iii)	I&T frequency	25
119(j)(4)(i)	Inspections and tests not performed	24
119(d)(3)(i)(D)	Relief system design & design basis	24
119(f)(1)(i)(D)	Emergency shutdown in OPs	24

# Lessons Learned

- **Main Challenge – Refinery NEP hours 40 times greater than average OSHA inspection**
  - 1000 hours for REF NEP inspection
  - 25 hours for average OSHA inspection
- **Learnings**
  - List based approach does find hazards
    - Compared to PQV approach
  - The listed questions also result in many “off-script” citations
  - CSHO training works
  - OSHA focus on RAGAGEP resulted in large number of deficiencies
  - 20+ years after SHELL-Norco & Phillips-Pasadena, refining industry still has many problems with facility siting

# *Other Learnings from the Refinery NEP*

- Citations in the NEP reflect the focus on PSI, Incident Investigation, and the various elements involving RAGAGEP in Inspection Priority Items (IPI), and improved CSHO training
- Refineries are not resolving PHA and audit findings and recommendations at a rate expected of large, sophisticated employers

***PSM-Covered Chemical Facilities  
National Emphasis Program***

**The “Chem NEP”**

# Chem NEP

- Pilot Chem NEP effective July 27, 2009
  - Region I – CT, MA, ME, NH, RI
  - Region VII – Nebraska, Kansas, Missouri
  - Region X – Idaho
- Extended **nationwide** Nov. 29, 2011
- Outlines a **different approach** for inspecting PSM-covered chemical facilities
- **Not** comprehensive
- **Less** resource-intensive

# Chem NEP

- State plan participation is now required
  - Can adopt Federal program or develop one that is *equally protective*
- CSHO's must check abatement of PSM citations requiring abatement going back six years

# *Chem NEP Approach*

## Differs from Refinery NEP

- Intent is to perform a larger number of shorter, less resource intensive, inspections
- A small number of “dynamic” list questions are applied to a selected unit or units
- No static list questions



# *Chem NEP Approach*

- Questions are specific and contain compliance guidance (similar to Refinery NEP)
- Questions differ by type of facility
  - Ammonia refrigeration
  - General PSM (e.g., storage only)
  - Chemical Processing
- Dynamic questions are not published outside OSHA
- Questions change periodically

# Details

- Details of OSHA inspection procedures (Field Operations Manual), as well as company and employee rights and obligations, can be found on OSHA's website
- The text of the Chem NEP (but not the dynamic list questions) is also accessible at [www.OSHA.gov](http://www.OSHA.gov)

# *Chem NEP Inspections – November 2011*

## *(Completion of Pilot)*

- 173 inspections have issued citations
- Average 8.4 citations per inspection with citations
- Average \$31,587 in proposed penalties per inspection with citations

# Chem NEP Inspections – November 2011

- >60 standards cited:
- 5 major standards categories
  - 1910 General Industry
  - 1904 Record Keeping
  - 5a1 General Duty
  - 1926 Construction
  - 1903 Inspections (abatement verification)
- 1,487 total proposed violations
- \$5,464,553 total proposed penalties
- Overwhelming majority of violations under 1910 -  
General Industry (>90%)

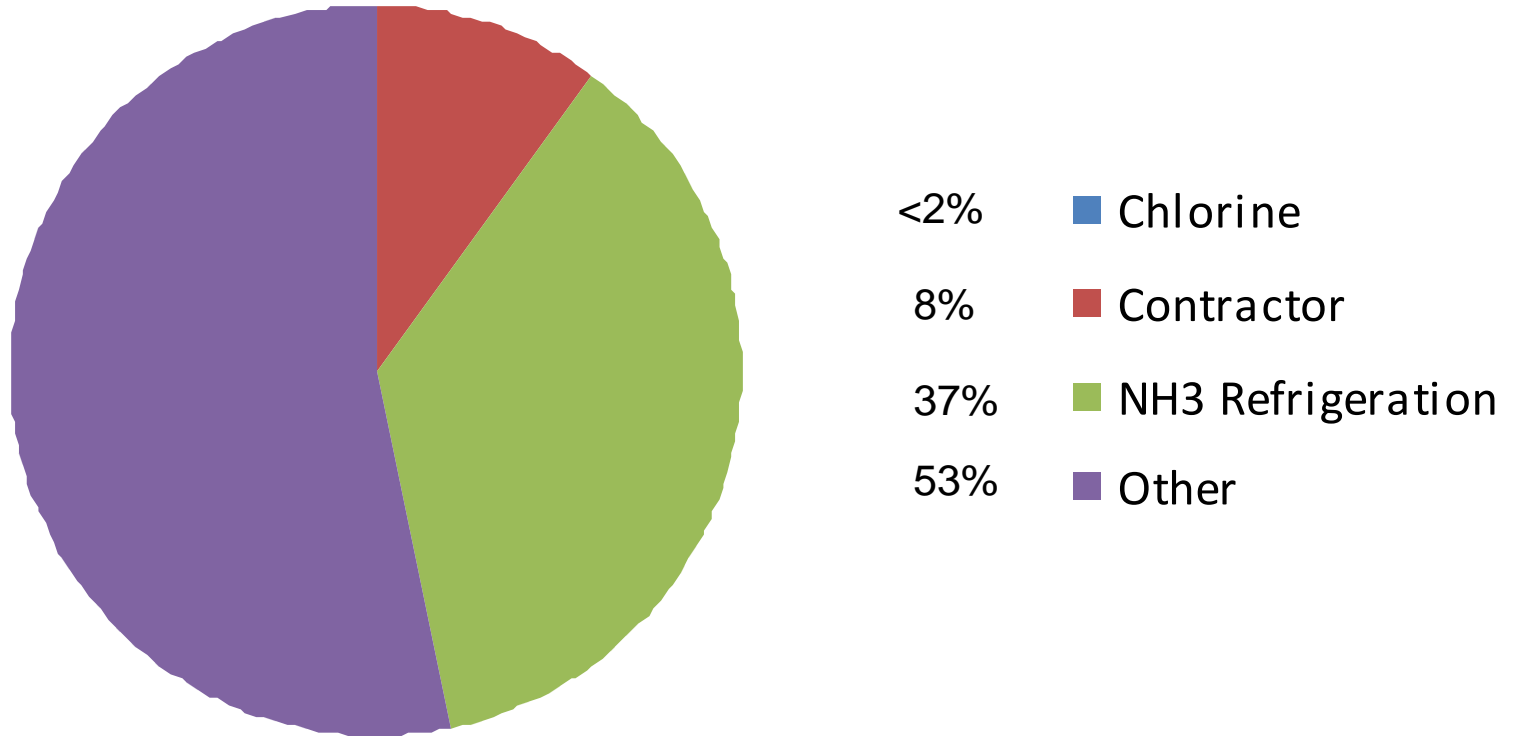
# Top Twelve 1910 Standards Violated

	Description	#	Cum %
1910.119	Process Safety Management	891	59.9
1910.147	Lockout / Tagout	55	63.6
1910.120	Haz Waste & Emergency Response	47	66.8
1910.134	Respiratory Protection	36	69.2
1904.029	Forms (Record Keeping)	31	71.3
1910.023	Guarding Openings	31	73.4
1910.305	Electrical	22	74.8
1910.1200	HazCom	19	76.3
1910.146	Permit Req'd Confined Space	19	77.5
1910.151	Medical Services & First Aid	19	78.8
1910.212	Machine Guarding	19	80.1
5a1	General Duty	18	81.3



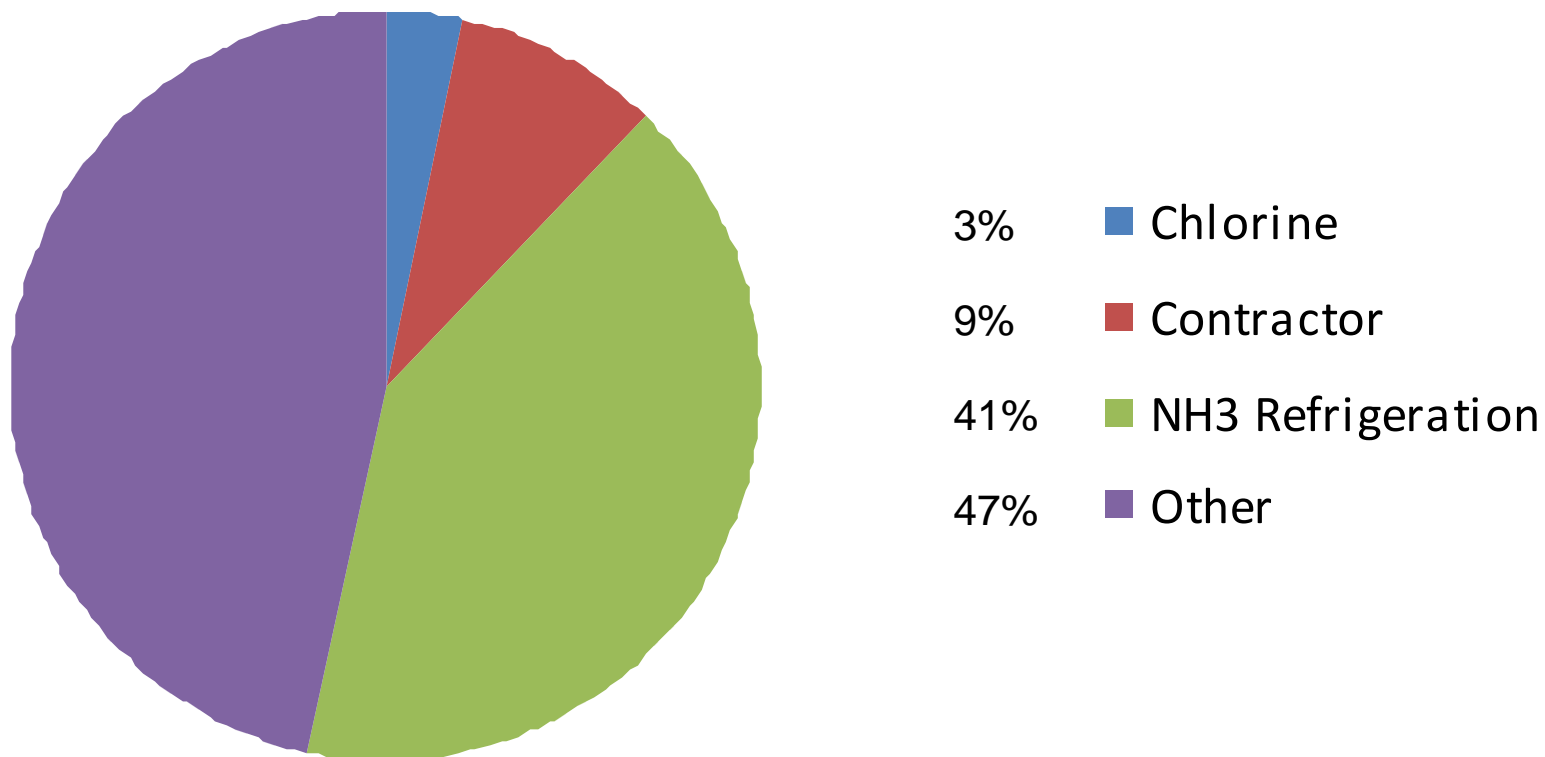
# Chem NEP Inspections – Facility Type

## Unprogrammed Inspections - 38%



# *Chem NEP Inspections – Facility Type*

## **Total Inspections**



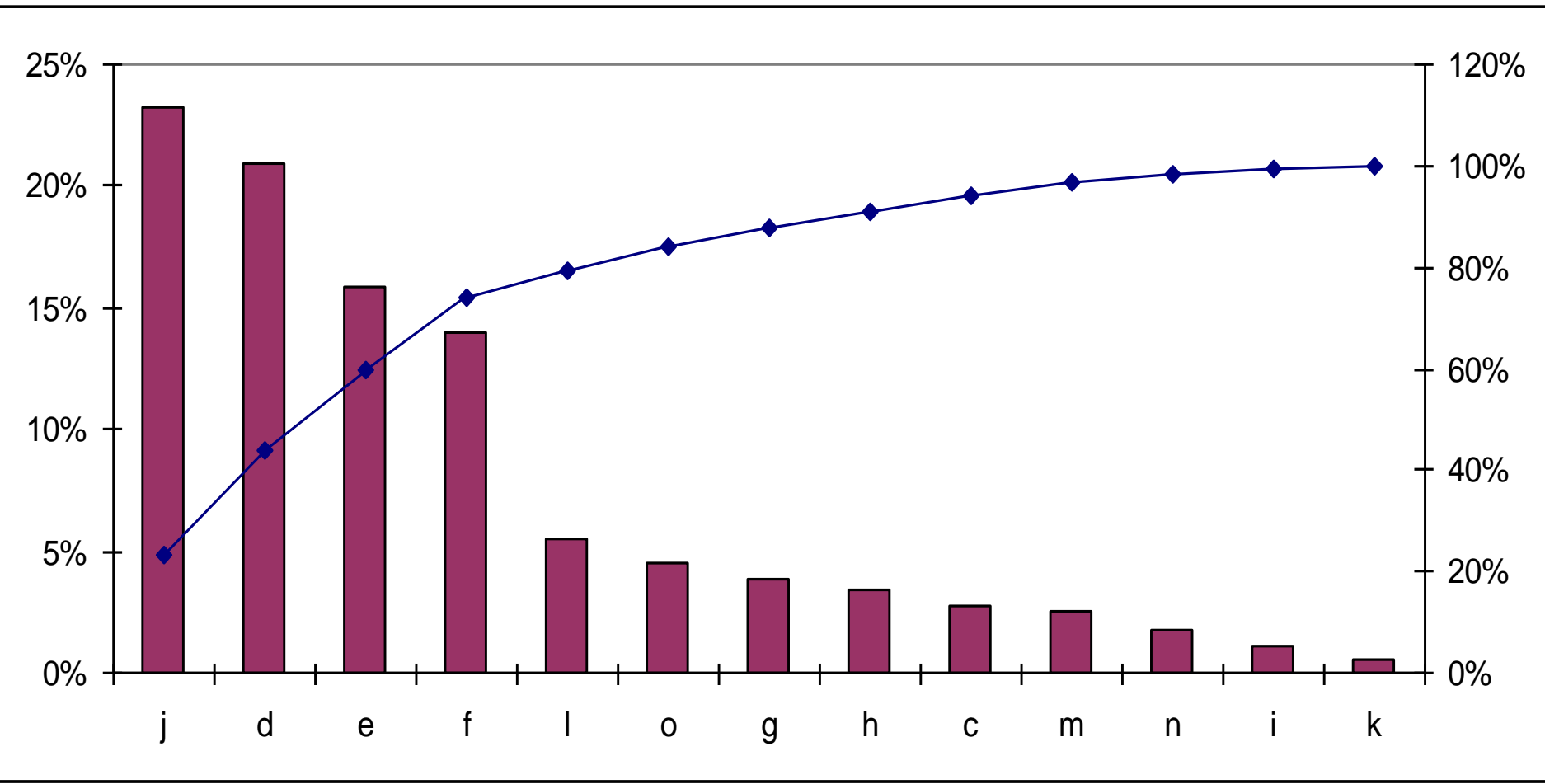
# Chem NEP Citations by PSM Element

Element	Description	% of PSM Citations	Cumulative %
j	Mechanical Integrity	23.2%	23.2%
d	Process Safety Information	20.9%	44.1%
e	Process Hazard Analysis	15.8%	59.9%
f	Operating Procedures	14.0%	74.0%
l	Management of Change	5.5%	79.5%
o	Compliance Audits	4.5%	84.0%
g	Training	3.8%	87.8%
h	Contractors	3.4%	91.1%
c	Employee participation	2.8%	93.9%
m	Incident Investigation	2.6%	96.5%
n	Emergency Planning & Response	1.8%	98.3%
i	Pre-startup Review	1.1%	99.4%
k	Hot Work	0.6%	100.0%



# Chem NEP Citations by PSM Element

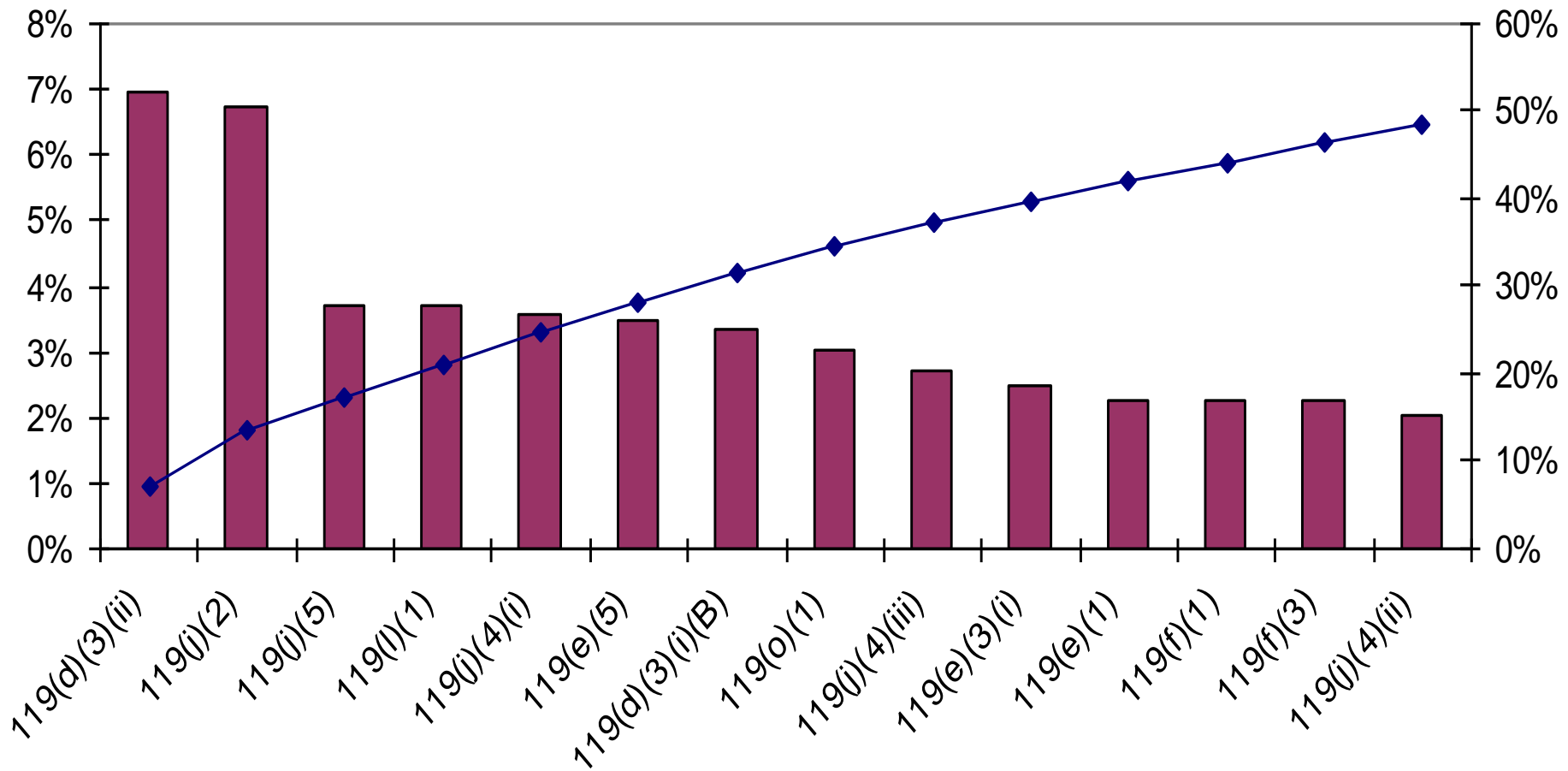
## Pareto Chart



# Chem NEP Citations by PSM Sub-element

Sub-element	Description	% All Citations	Cumulative %
119(d)(3)(ii)	PSI RAGAGEP	7.0%	7.0%
119(j)(2)	MI written procedures	6.7%	13.7%
119(j)(5)	MI equipment deficiencies	3.7%	17.4%
119(l)(1)	Management of Change dev & imp	3.7%	21.1%
119(j)(4)(i)	MI I&T performance	3.6%	24.7%
119(e)(5)	PHA findings & recommendations	3.5%	28.2%
119(d)(3)(i)(B)	PSI P&IDs	3.4%	31.5%
119(o)(1)	Compliance Audits performed / certified	3.0%	34.6%
119(j)(4)(iii)	MI I&T frequency	2.7%	37.3%
119(e)(3)(i)	PHA Hazards of the Process	2.5%	39.7%
119(e)(1)	PHAs performance	2.2%	42.0%
119(f)(1)	OP Developed & Implementation	2.2%	44.2%
119(f)(3)	OP annually certified	2.2%	46.4%
119(j)(4)(ii)	MI I&T follow RAGAGEP	2.0%	48.5%

# Chem NEP Citations by PSM Sub-element (Pareto)



# *VPP Sites and the NEPs*

- VPP sites are **not** subject to **programmed** inspections
- However, the NEP applies OSHA-wide for **unprogrammed** PSM related inspections:
  - Accidents
  - Complaints
  - Referrals
  - Catastrophes

# *PSM....What's Being Cited*

## **EXAMPLES**

**1910.119.....**

# d(3) PSI Citations

- P&ID's not accurate
- Relief system design & design basis not documented
- Failure to document that equipment follows **RAGAGEP**
  - Relief device set at 540 psig for 480 psig MAWP (ASME B&PV Code)
  - Relief isolation valve positions not controlled (ASME B&PV Code)
  - Relief valves undersized (API 521)
  - KO drum w/ inadequate retention time (API 752)
  - Trailers located subject to blast loading (API 753)
  - Positive pressure air supply to control building not alarmed (NFPA 496-2003 Section 7.4.7)

# *j(4) MI Inspect & Test Citations*

- All aspects of j(4) cited
- Many types of equipment & controls.
- Many problems involved thickness measurements
- Examples:
  - Process piping not inspected per facility's I&T program
  - I&T schedule on relief valves not adjusted when valves found to be heavily fouled
  - Cathodic protection system & process analyzers not tested per employers program requirements
  - Anomalous thickness measurements not resolved per **RAGAGEP** (e.g., API 570)
  - No inspection data for critical process piping circuit
  - Thickness readings not documented

# *f(1) Op Procedures Citations*

- Many regarding procedures for emergency shutdown, safe operating limits, operations w/o procedures
- Examples:
  - Failure to address when emergency shutdown required & assignment to qualified operators
  - Operating limits – procedures not consistent w/ instructions on DCS / control board
  - No procedures for operation of complex unit blowdown systems
  - Lack of emergency OPs for flare system
  - No procedure for switching lube pumps on large compressor



# e(3) PHA Citations

- Not addressing siting or human factors; others for not addressing consequences of failure of controls, not identifying previous incidents
- Examples:
  - **Siting** - failure to address potential atmospheric blowdown impacts on shelters, furnaces, control rooms
  - **Human Factors** – failure to consider HF, failure to evaluate operator / DCS alarm interface, failure to consider risk posed by unmarked equipment
  - **Hazards** – freeze protection of process piping
  - **Hazards** – lack of support steel fireproofing near likely release points (pump seals)
  - **Incidents** – failure to consider previous incident with explosive gas under UPS battery room

# *j(5) MI Deficiency Citations*

- Wide variety of equipment operated outside acceptable limits
- Examples:
  - Pipe or equipment thickness measurements below retirement thickness
  - Intervening valves to/from relief valves not car sealed open
  - Pressurized electrical cabinets w/o functional alarms
  - Broken flange bolts
  - Inoperable control panel board indicator lights
  - Inoperable valves (broken, non-functional, or fouled)
  - Gage glasses unusable
  - Toxic / LEL gas detectors in control room air supply not working

# *j(2) MI Procedure Citations*

- Procedures often lacking for special situations, and for evaluating and resolving anomalous data
- Examples of missing or deficient procedures:
  - For under-insulation corrosion; for injection locations; for pressure vessels
  - For inspecting non-metallic linings in pressure vessels
  - Procedures did not address adequate number and locations of TMLs
  - Relief valves past inspection intervals (many)
  - No procedures for performing repairs on pressure vessels (welder quals & certs, QC, etc.)
  - No procedure for resolving thickness measurement **increases** (anomalous data)

# e(5) PHA Recommendations Citations

- Mostly failure to resolve recommendations at all, or in a timely manner.
- Many recommendations requiring little investment go unresolved and unimplemented – “**low hanging fruit**”.
- Examples of unresolved findings/recommendations:
  - Relief isolation valves not car sealed open
  - 23 findings from 1996 PHA still unresolved
  - PHA recommendations “rolled over” from previous study, including instruments and alarms for detecting critical equipment conditions
  - Recommendations on blast exposure of control rooms from multiple siting studies not resolved (periodically do new studies without resolving issues)
  - No written plans for implementing agreed actions

# *m(1) Incident Invest Citations*

- Failure to investigate potentially catastrophic incidents (near-miss); frequently multiple instances
- Examples of failing to investigate
  - Pump seal failures
  - Packing blown out of pump
  - HC liquid and vapor releases
  - Exchanger acid/HC leaks (alky units)
  - Corrosion
  - FCC fire
  - Overpressure leading to release to flare system
  - Pipe rack and line releases
  - Instrument leaks and failures

# *m(4) Incident Invest Citations*

- Citations for all sub-elements. Failure to include all required information is common.  
**Contributing factors** are often left out, or are tangential to the actual contributing factors
- Examples:
  - Date investigation began not listed
  - No determination of how cross-contamination occurred or was corrected
  - **Causal factors** not documented in 2 crude heater tube leak fires; in weld corrosion failure; in failure of faulty weld, in fan shaft breakage, in over-temperature on a reactor, on smoke in a substation
  - Recommendations not established in crude heater fire

# I(1) MOC Citations

- Most frequently cited MOC was for failure to establish or implement equipment design changes followed by operating procedure changes.
- Examples
  - Removing secondary process piping wo/conducting MOC
  - Increasing charge to units wo/MOC
  - Changing procedures for addition of methanol to chloride injection tank
  - No MOC for temporary weld patch for hole in pressure vessel
  - 3,600 barrel throughput change in unit wo/MOC
  - Added seven exchangers and associated piping to crude unit wo/MOC
  - No MOC for control room upgrade
  - 47 operating procedure changes and 58 alarm set point changes wo/MOC
  - No MOC for placement of temporary structures

# o(4) *Audit Citations*

- Primarily failures to address deficiencies identified in compliance audits and document their correction
- Examples:
  - Problems with PSSR and MOC tracking and approval noted in last two compliance audits not resolved
  - Finding that OPs not being updated or unaddressed
  - Correction of deficiencies in maintenance program not documented
  - Audit findings from previous CA not addressed
    - Ventilation system designs for control rooms
    - Safety system information not available
    - Testing & inspection frequencies not complying with RAGAGEP



# QUESTIONS

# OSHA's DEP PSM Team

- Jim Lay
  - [Lay.jim@dol.gov](mailto:Lay.jim@dol.gov)
  - 202-693-1827
- Jeff Wanko
  - [JWanko@dol.gov](mailto:JWanko@dol.gov)
  - 202-693-2137
- Mike Marshall
  - [Marshall.mike@dol.gov](mailto:Marshall.mike@dol.gov)
  - 202-693-2179

The background of the entire image is a stylized American flag, with the stars in the upper left and the stripes in the lower right. The OSHA logo is centered in the upper half. The 'O' is a large, 3D-style letter with a blue and white circular design inside. The letters 'S', 'H', and 'A' are white with a 3D effect. A registered trademark symbol (®) is located to the upper right of the 'A'.

**OSHA<sup>®</sup>**

**Occupational Safety  
and Health Administration**

**[www.osha.gov](http://www.osha.gov)  
800-321-OSHA**