

Robust Emergency Planning and Response: Weaknesses and Key Lessons

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1. Introduction

One of the key elements in any effective Process Safety Management (PSM) program is the Emergency Preparedness plans and procedures. However, poor or inadequate emergency planning or response has been a recurring finding in the Process Industry. Establishment of a sound emergency response plan is vital in safeguarding not only employees and the community, but also in minimizing facility damage and environmental releases.

The present study focuses on the results from 16 PSM audits performed by ioMosaic between 2010 and 2016, at several different Chemical Process Industry (CPI) facilities. On the one hand, we have evaluated how well these facilities complied with the requirements of the OSHA PSM Standard (29 CFR 1910.119). On the other hand, the data from the audit findings has been compiled and statistically processed in order to specifically assess the findings related to Emergency Planning and Response, one of the 14 elements of the OSHA PSM (Figure 1).

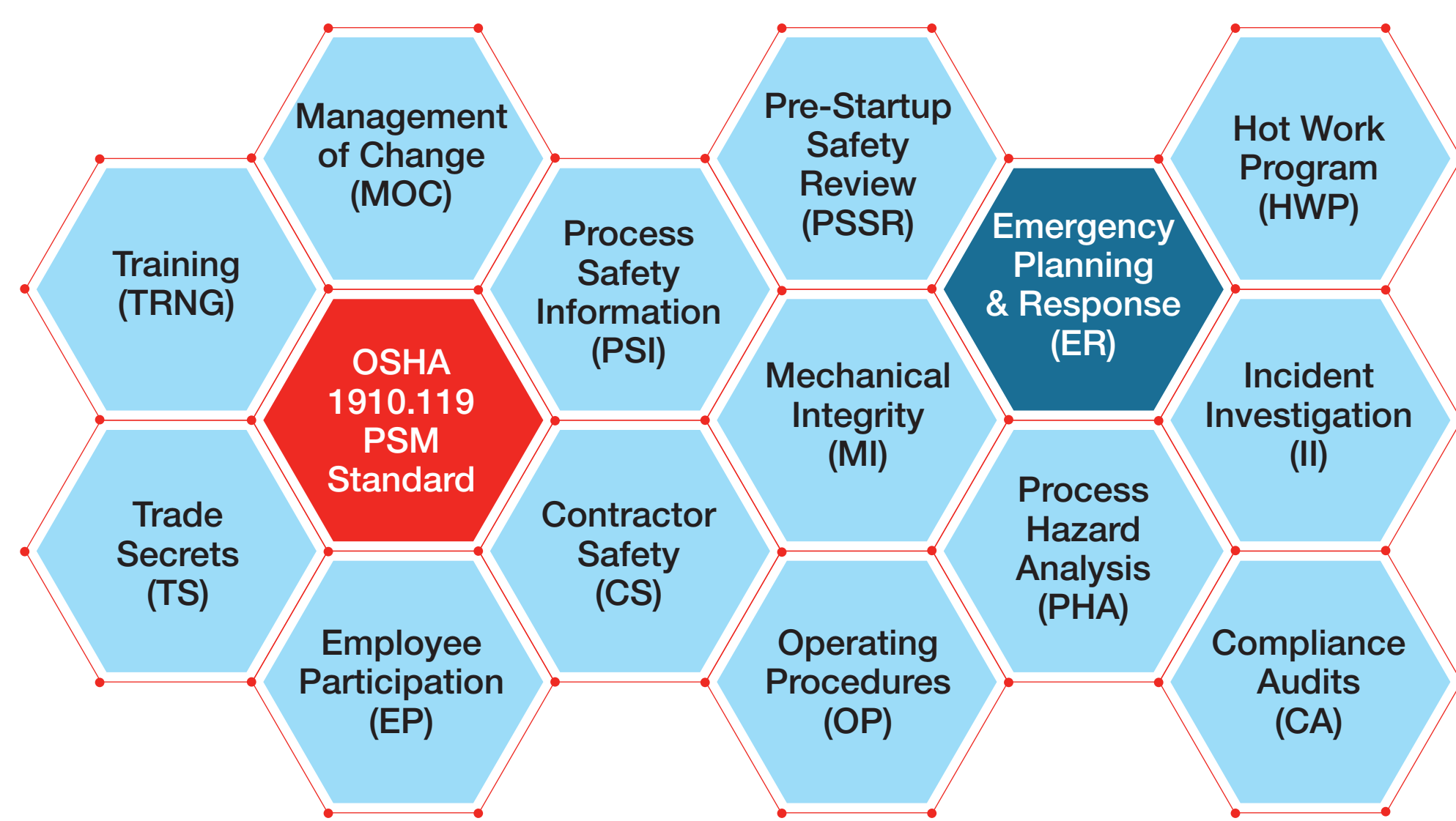


Figure 1 – 14 Elements of the OSHA PSM Standard

All covered facilities require compliance audits every three years. These audits serve as the ongoing quality assurance process for the process safety management systems.

4. Results and Conclusions

Audit findings are a valued source of information for understanding current weaknesses and lessons learned and provide an opportunity to significantly improve any PSM system and minimize the consequences of any catastrophic incident.

Based on the results from ioMosaic audits, the elements Mechanical Integrity (MI), Operating Procedures (OP), Process Safety Information (PSI), Hot Work Program (HWP), Incident Investigation (II), and Emergency Planning and Response (ER) can be considered the most cited and correspond to almost 70% of all findings. Emergency Planning and Response represents 10% of the total findings (Figure 6) and is considered one of the main elements identified in the audits.

In general, our analysis suggests a pattern of repeat findings including lack of training, incomplete emergency planning, absent or poorly defined emergency roles and responsibilities.

We conclude that Emergency Planning and Response is a key weakness of many audited PSM programs and we believe that our analysis provides useful industry guidance to help develop and improve emergency preparedness, planning and response.

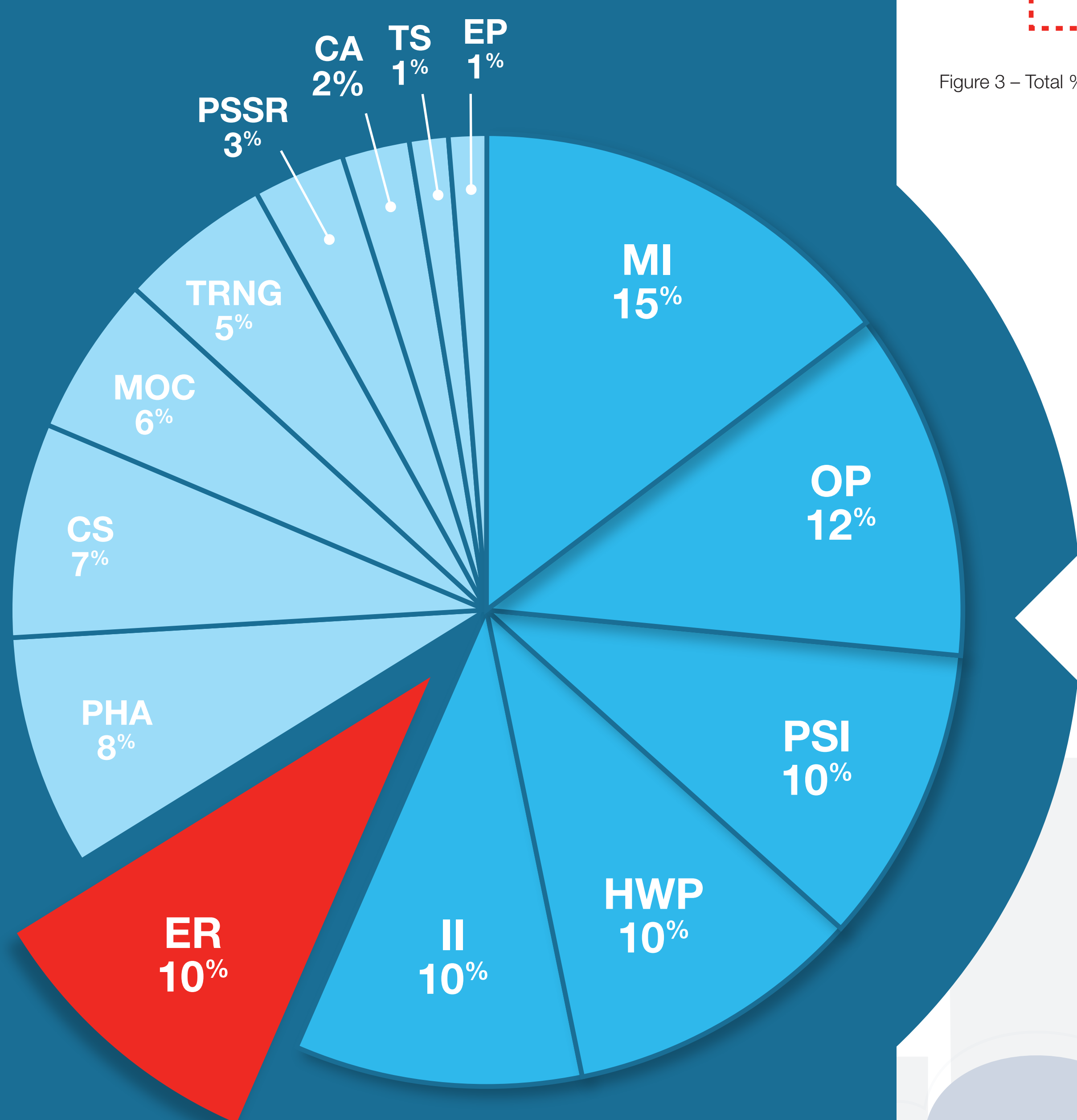


Figure 6 – Distribution of all the findings (Regulatory + RAGAGEP + Local Attention) per element.

Abbreviations key in alphabetical order: Compliance Audits (CA), Contractor Safety (CS), Emergency Planning & Response (ER), Employee Participation (EP), Hot Work Program (HWP), Incident Investigation (II), Management of Change (MOC), Mechanical Integrity (MI), Operating Procedures (OP), Pre-Startup Safety Review (PSSR), Process Hazard Analysis (PHA), Process Safety Information (PSI), Trade Secrets (TS), Training (TRNG).

2. Audit Findings: Statistical Analysis

The scope of the audit findings included all 14 PSM elements. The audit findings were identified based on the following categories: Regulatory – related to the OSHA PSM Standard, RAGAGEP – related to Recognized and Generally Accepted Good Engineering Practice, and Local Attention – of a relatively minor nature or not within the scope of the audit.

Distribution of the Audit Findings

A statistical analysis of each of the 16 audits was conducted. The study identified a total of 1,108 findings, from which 58% were Regulatory, 24% were Local Attention, and 18% were RAGAGEP (Recognized and Generally Accepted Good Engineering Practice) (Figure 2).

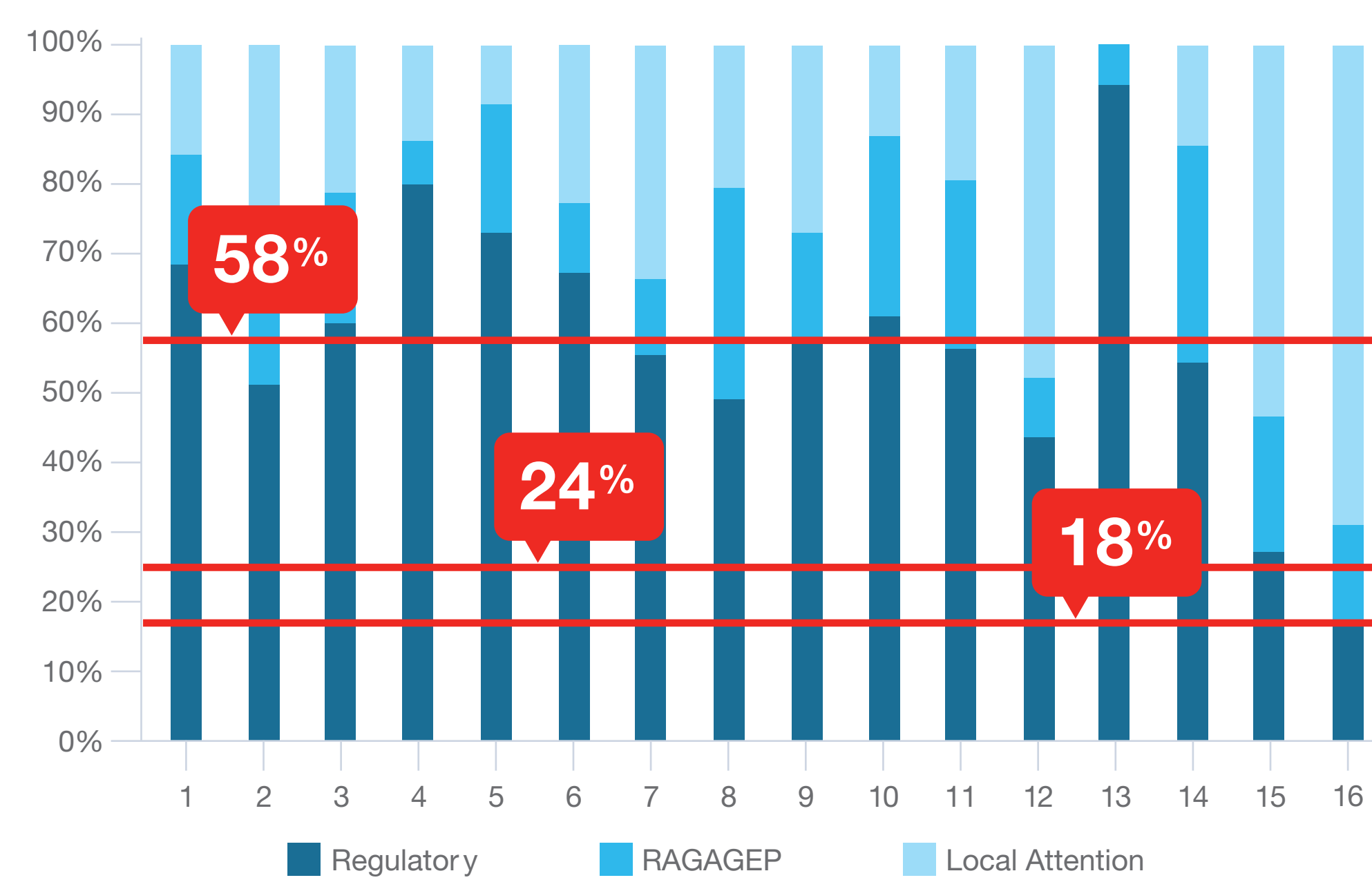


Figure 2 – Distribution of the findings per audit conducted

Regulatory Findings Category

The total number of regulatory findings were 626. Emergency Planning and Response (ER) accounted for 7% of the regulatory findings. The other 4 highlighted main elements: Mechanical Integrity (MI), Process Safety Information (PSI), Operating Procedures (OP), and Hot Work Program (HWP) accounted for almost 53% of all regulatory findings (Figure 3).

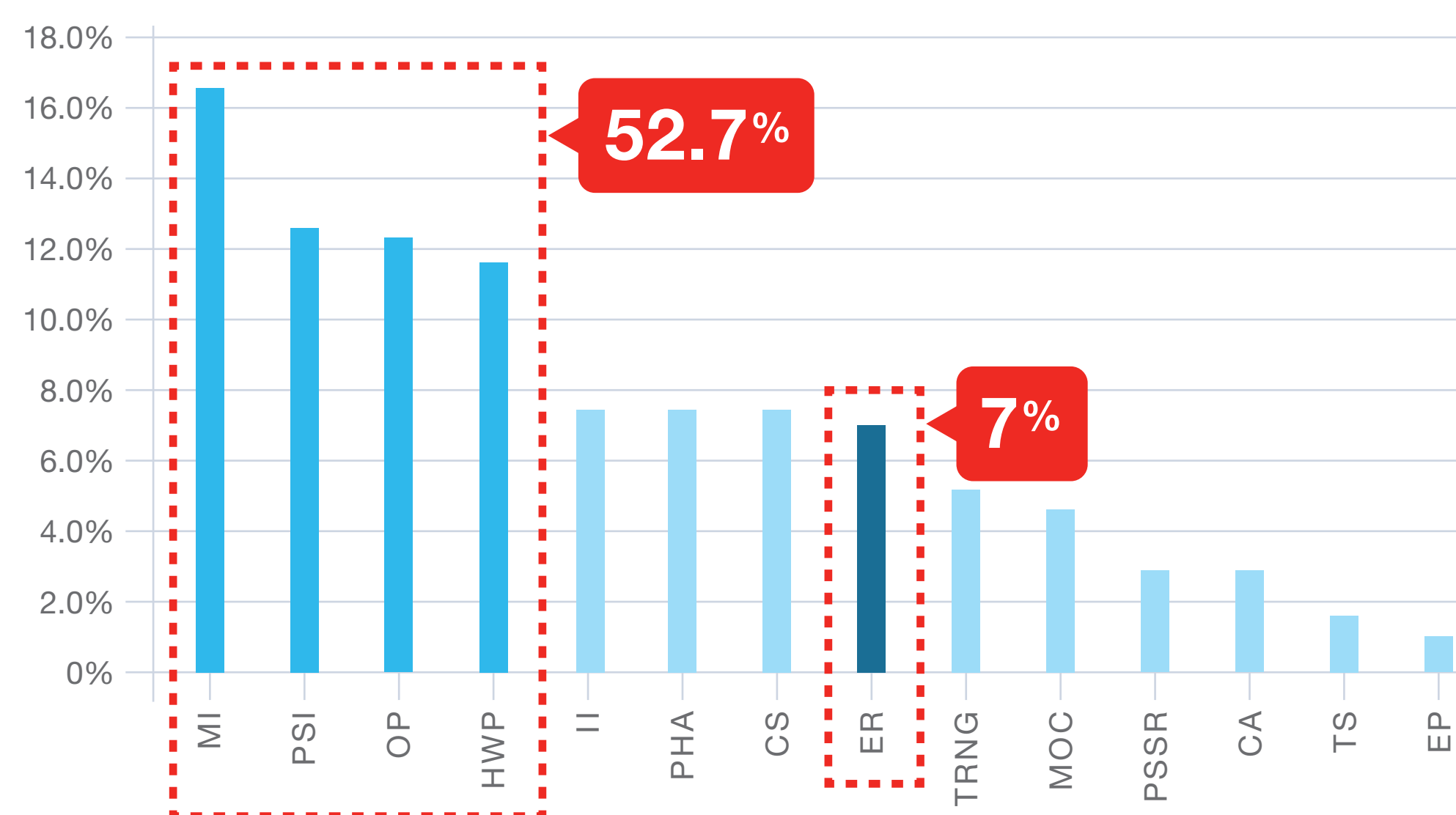


Figure 3 – Total % of regulatory findings for each of the 14 OSHA PSM elements

RAGAGEP Findings Category

The total number of RAGAGEP findings were 199. Emergency Planning and Response (ER) accounted for 9% of the RAGAGEP findings. The other 4 highlighted elements: Mechanical Integrity (MI), Incident Investigation (II), Process Hazards Analysis (PHA), and Operating Procedures (OP) accounted for almost 60% of all RAGAGEP findings (Figure 4).

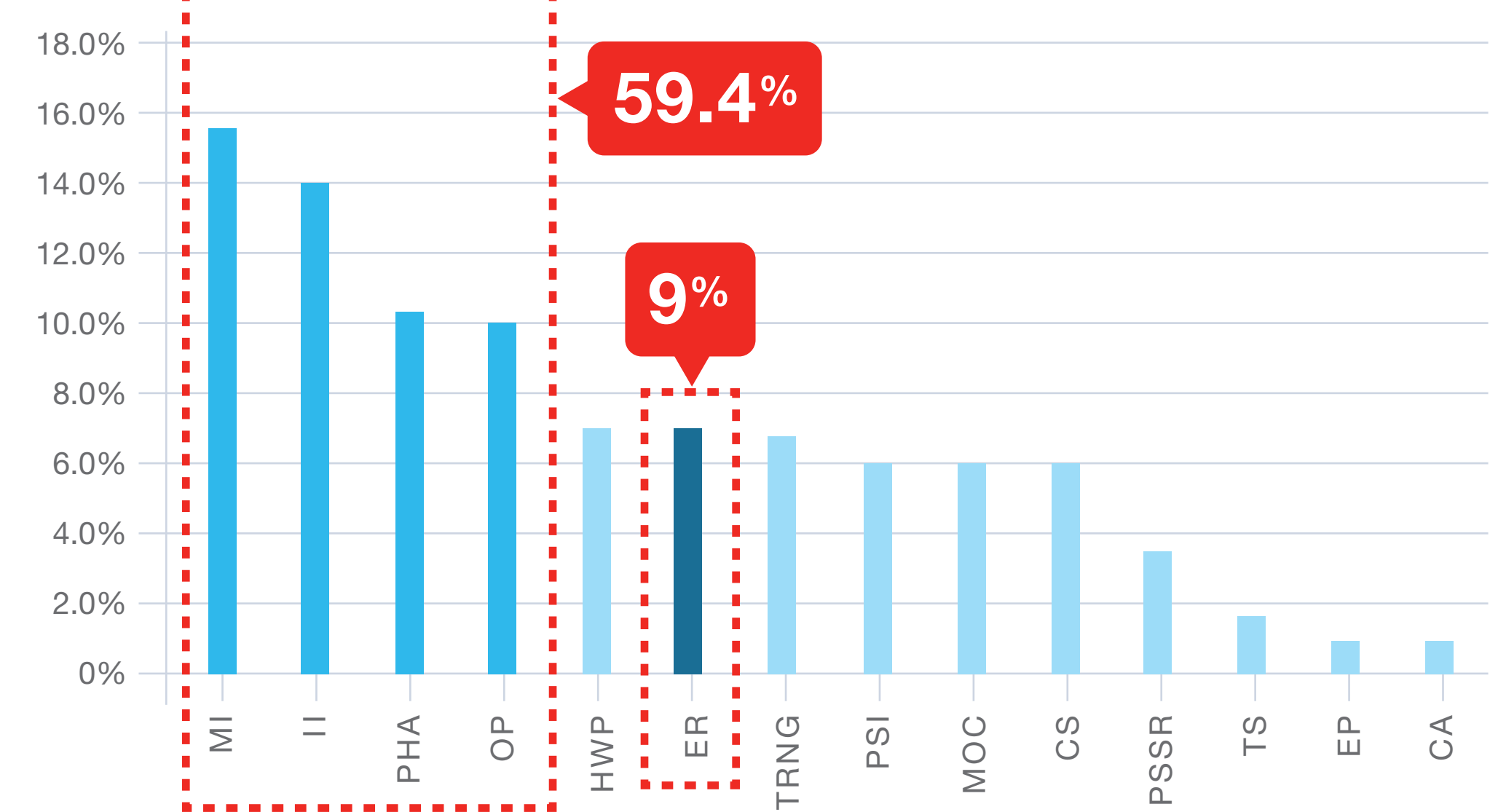


Figure 4 – Total % average of RAGAGEP findings per each of the 14 OSHA PSM elements

Local Attention Findings Category

Out of the 261 local attention findings, 42 relate to Emergency Planning and Response (EP), representing the 16% of all findings. The other important elements: Operating Procedures (OP), Incident Investigation (II), and Mechanical Integrity (MI) represented 50% of all local attention findings (Figure 5).

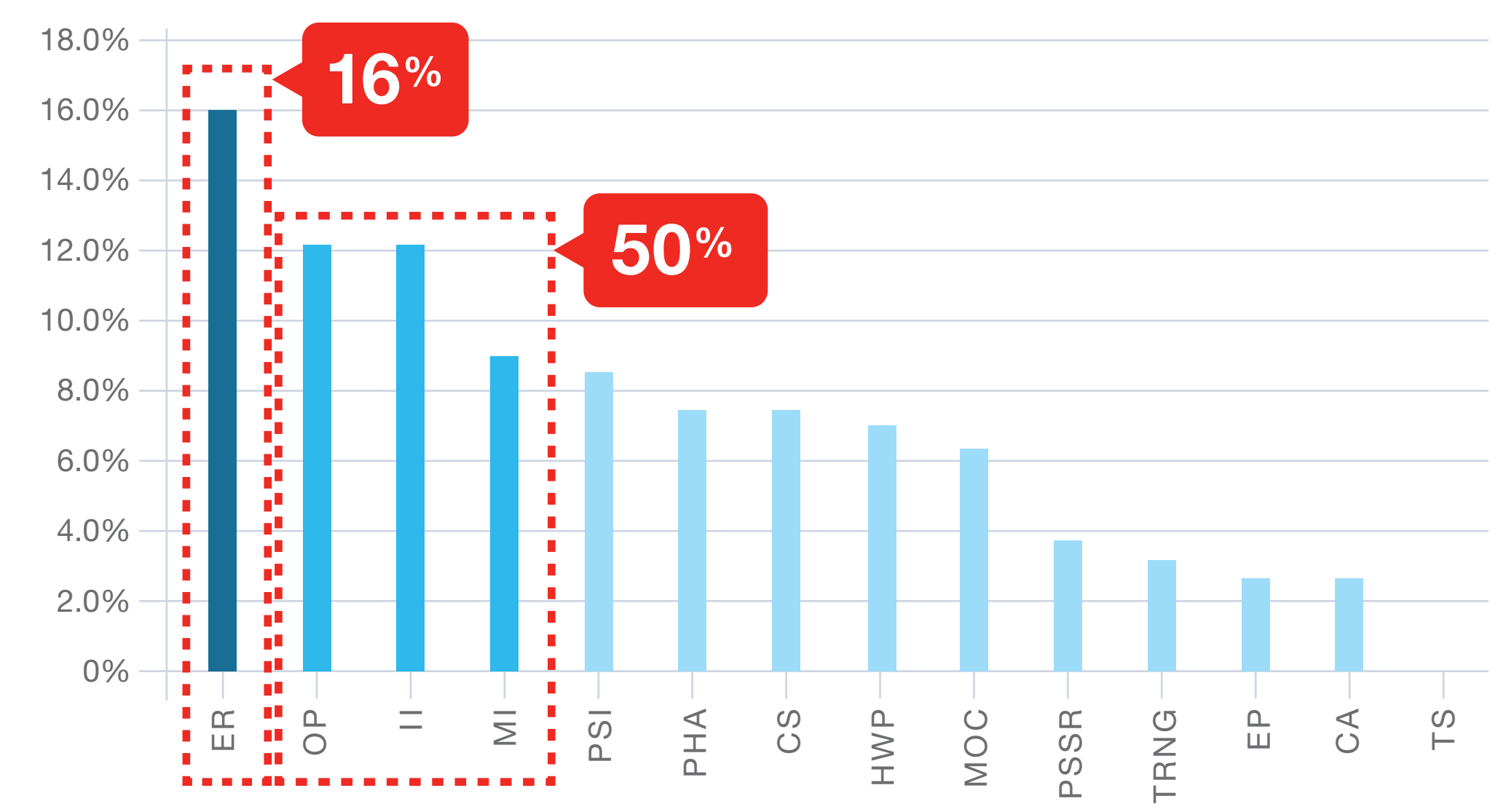


Figure 5 – Total % average of local attention findings per each of the 14 OSHA PSM elements

3. Emergency Planning and Response: A Weakness of PSM Programs

Emergency Preparedness is one of the key elements in any effective process safety management program. However, poor or inadequate emergency planning or response has been a recurring finding in the Process Industry, as presented in this study.

Key Findings Identified

- Emergency plans don't include or refer to the corresponding procedures
- No training plan for Emergency Response personnel
- Emergency Response personnel responsibilities are not known or poorly defined
- Formal written procedure lacking for employees to review their roles in the Emergency Planning and Response Plan when their responsibilities change
- No emergency power back-up system for the plant-wide alarm system
- Evacuation routes are not clearly marked

Essential Training Requirements of an Emergency Response Plan

- Individual roles and responsibilities
- Threats, hazards, and protective actions
- Notification, warning, and communications procedures
- Emergency response and shutdown procedures
- Evacuation, shelter, and accountability procedures
- Location and use of common emergency equipment
- Means for locating family members in an emergency

Minimum Requirements of an Emergency Response Plan

- Pre-emergency planning and coordination with outside parties
- Personnel roles, lines of authority, training and communication
- Emergency alerting and response procedures
- Safe distances and places of refuge
- Site security and control
- Evacuation routes and procedures
- PPE and emergency equipment
- Emergency medical treatment and first aid
- Decontamination
- Critique of response and follow-up
- Emergency recognition and prevention