PROCESS SAFETY INCIDENTS – BIG PICTURE REVELATIONS

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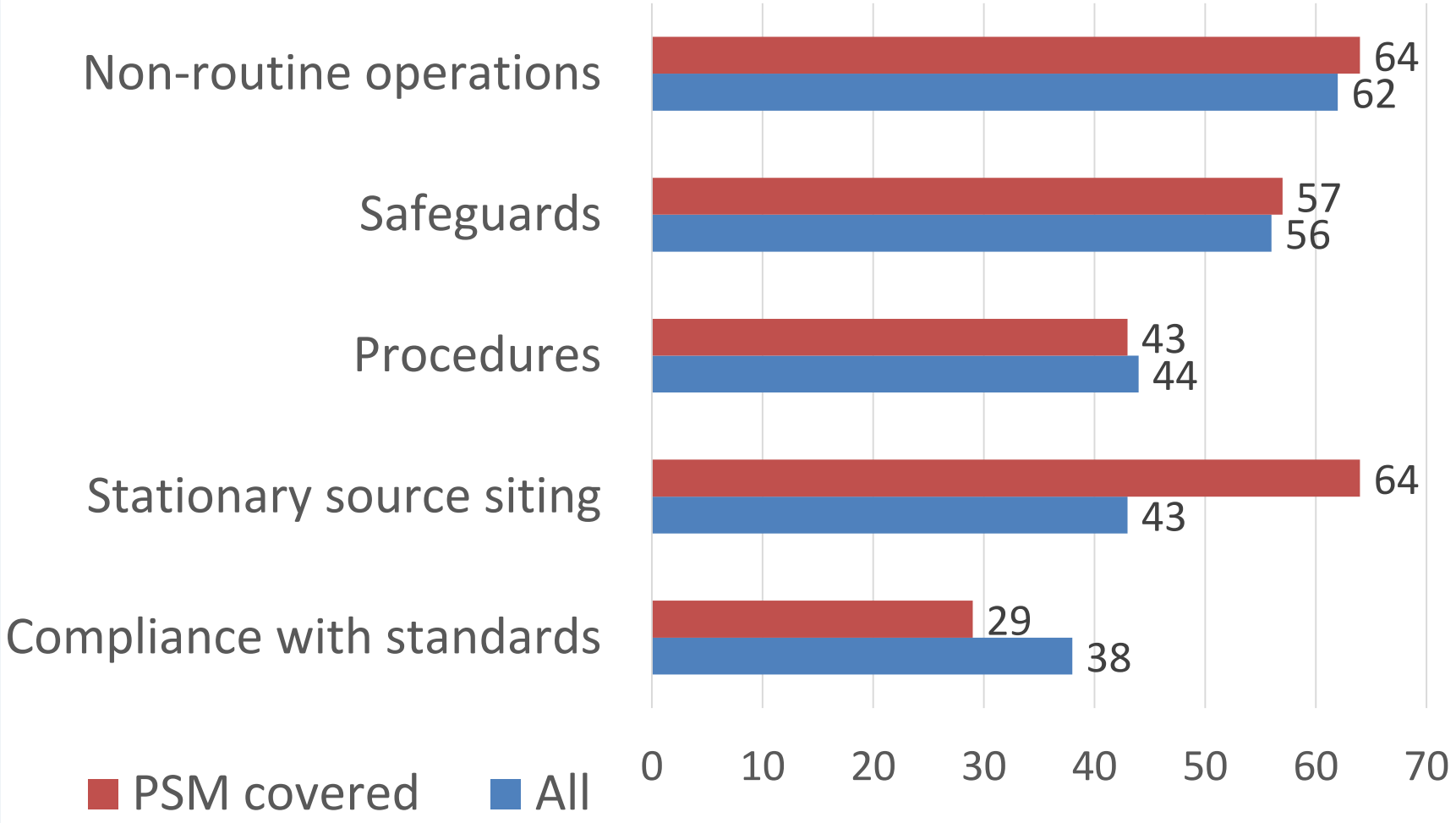
OVERVIEW

- Process safety incidents continue to occur
  - Despite regulations and industry practices
- Objective of paper:
  - Understand reasons for continuing incidents
- Identify trends and commonalities across a large set of process safety incidents
- Total of 80 incidents studied
  - 68 CSB completed investigations
    - 28 covered by PSM
  - 12 from CCPS *Incidents that Define Process Safety*

CONTENTS OF PAPER

- Statistical analysis of process safety issues for CSB incidents
  - 15 common issues identified
  - Further issues identified with fewer incidents
- Identification of specific incidents for each type of issue
- Discussion of the nature of the issues
- Recommendations to address each type of issue
- Overall recommendations
  - Including some for the CSB

ANALYSIS RESULTS



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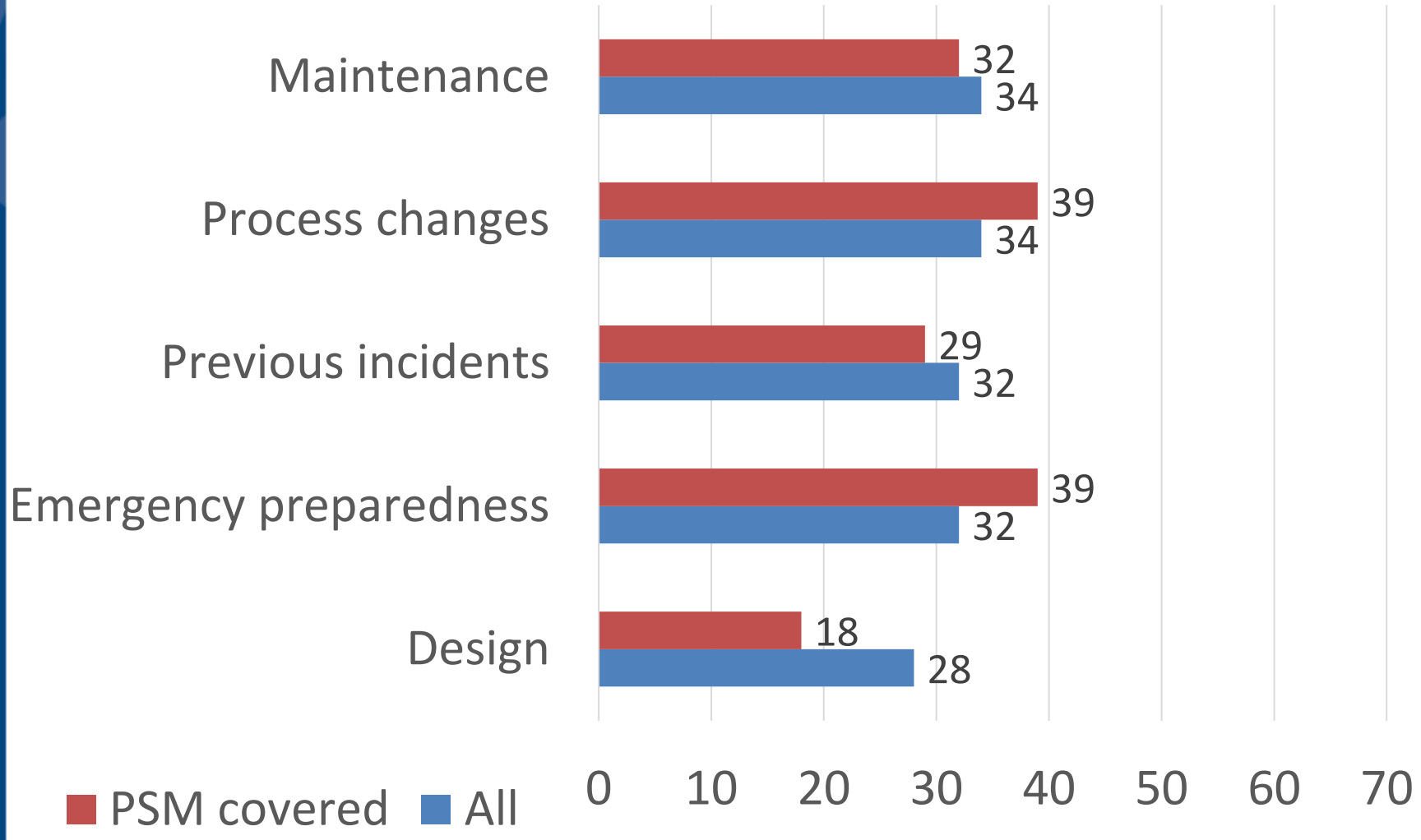
ANALYSIS RESULTS (CONTD.)



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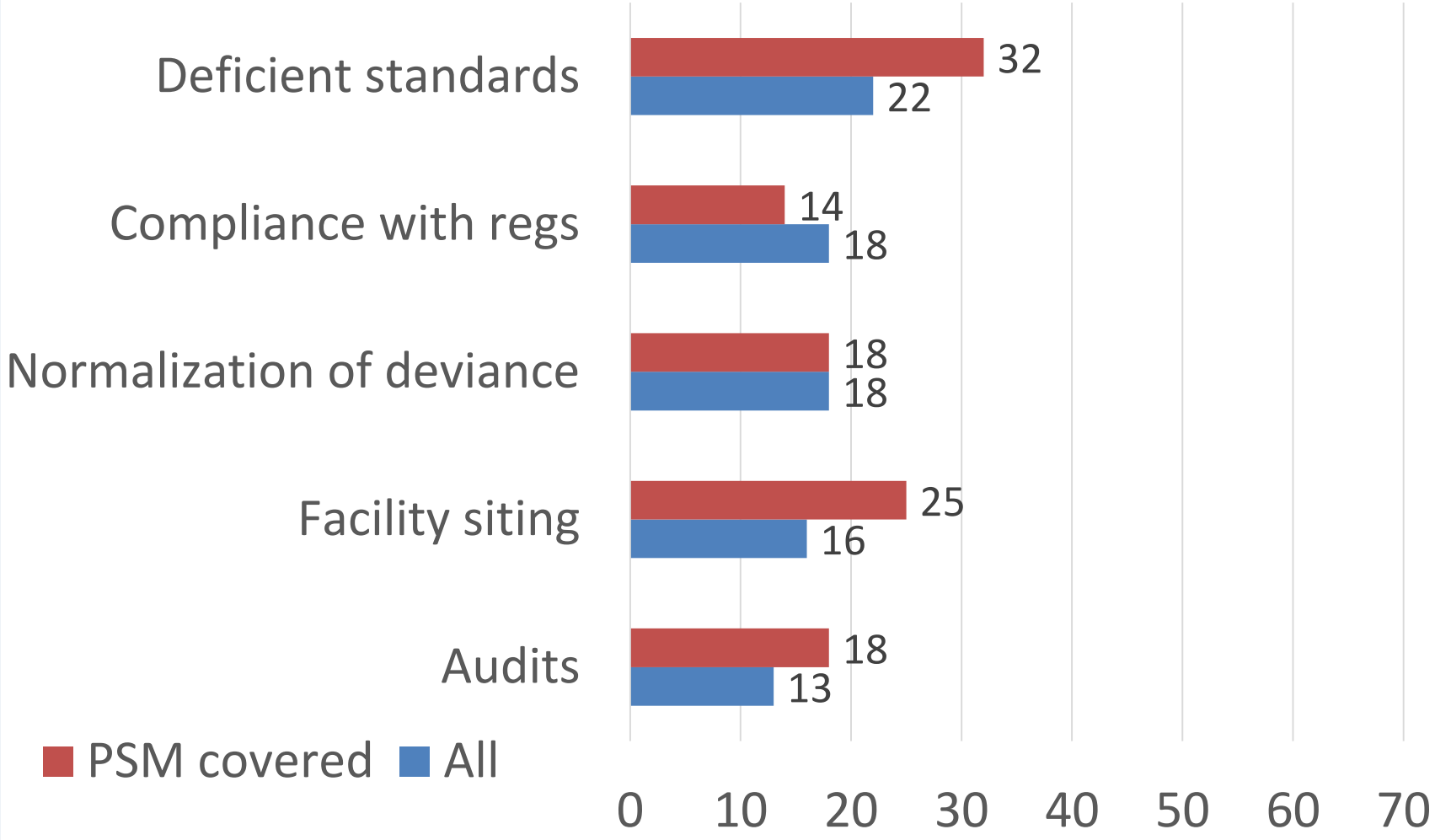
ANALYSIS RESULTS (CONTD.)



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OTHER KEY POINTS

- Time trend analysis does not show any reduction in the types of issues identified
- Percentages for issues actually may be higher
- Most incidents involved multiple issues
  - Average of 5
  - As many as 13

HUMAN AND ORGANIZATIONAL FACTORS (HOF)

- Results
  - Many HOF issues in incidents
  - Insufficient detail in CSB reports to provide percentages
  - Probably present to some degree in all incidents
- Recommendation:
  - Make HOF a separate process safety element
  - Teach critical thinking for process safety
  - Address cognitive biases in decision making

PROCESS HAZARD ANALYSIS (PHA)

- Results
  - Deficiencies were present in all cases where a PHA was performed
    - Incidents not identified
    - Safeguards too general and relied on procedures
- Recommendations:
  - Address competency of practitioners and teams
  - Address NROs directly in PHA
  - Don’t expect PHA to address maloperation
  - Conduct SIMOPs

KEY RECOMMENDATIONS

- Address non-routine operations (NROs) throughout all process safety elements
  - Require the use of JSA for all NROs
- Develop international standards for key process safety elements
- Manage process risks using the ALARP principle
- Set safety goals and/or risk tolerance criteria and demonstrate compliance with them

RECOMMENDATIONS FOR THE CSB

- Provide and perform an ongoing analysis of all CSB incidents by:
  - Expanding the incident attributes that are addressed in investigations
  - Providing an appendix to each investigation report that characterizes each attribute for the incident
  - Compiling a data base of incidents and their attributes that is searchable

CONCLUSIONS

- Process safety incidents continue to occur because there are common deficiencies in process safety practices
- Companies cannot rely on compliance with existing process safety regulations to protect against incidents
  - Regulations are seriously deficient
- Virtually all incidents that have occurred were preventable
- Future incidents can be prevented if we use the lessons than can be learned from identifying commonalities across incidents