

Regulatory Streams to trigger Process Safety Management for Small and Medium Enterprises

Process Safety Management Symposium
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Agenda

- Small and Medium Enterprises (SME)
- Process Safety Management (PSM)
- Trigger points of PSM
- PSM Elements for SMEs
- Conclusions

Small and Medium Enterprises

A (1-4) – Assembly occupancies

B (1-3) – Detention occupancies, Treatment occupancies, Care occupancies

C – Residential occupancies

D – Business and personal services occupancies

E – Mercantile occupancies

F1 – High-hazard industrial occupancies (Process Plants)

F2 – Medium-hazard industrial occupancies (Tank Farms)

F3 – Low-hazard industrial occupancies

(occupancy types based on fire and building codes of Canada)

Group F 1	Group F 2	Group F 3
<p>Bulk plants for flammable liquids</p> <p>Bulk storage warehouses for hazardous substances</p> <p>Cereal mills</p> <p>Chemical manufacturing or processing plants</p> <p>Distilleries</p> <p>Dry cleaning plants</p> <p>Feed mills</p> <p>Flour mills</p> <p>Grain elevators</p> <p>Lacquer factories</p> <p>Mattress factories</p> <p>Paint, varnish and pyroxylin product factories</p> <p>Rubber processing plants</p> <p>Spray painting operations</p> <p>Waste paper processing plants</p>	<p>Aircraft hangars</p> <p>Box factories</p> <p>Candy plants</p> <p>Cold storage plants</p> <p>Dry cleaning establishments not using flammable or explosive solvents or cleaners</p> <p>Electrical substations</p> <p>Factories</p> <p>Freight depots</p> <p>Helicopter landing areas on roofs</p> <p>Laboratories</p> <p>Laundries, except self-service</p> <p>Mattress factories</p> <p>Planing mills</p> <p>Printing plants</p> <p>Repair garages</p> <p>Salesrooms</p> <p>Service stations</p> <p>Storage rooms₄</p>	<p>Creameries</p> <p>Factories</p> <p>Laboratories</p> <p>Light-aircraft hangars (storage only)</p> <p>Power plants</p> <p>Salesrooms</p> <p>Sample display rooms</p> <p>Storage garages, including open air parking garages</p> <p>Storage rooms</p> <p>Warehouses</p> <p>Workshops</p>

Safety Regulations for SMEs

- Federal:
 - Transportation of dangerous goods (TDG)
 - Environment Canada (CEPA 1999 Act, SOR/2019-51)
- Provincial
 - Safety Regulations (Safety Codes Act, Fire Prevention Act, etc.)
 - Fire code, Building code, Gas Code, Electrical code,
 - Plumbing, Elevators and Amusement rides
 - Occupational Health and Safety
 - Environment
 - Transportation
- Municipal
 - Land use bylaws

Process Safety Management

Process safety is,

1. framework for managing the integrity of operating systems and processes,
2. handling hazardous substances,
3. achieved by applying good design principles, engineering, and operating and maintenance practices,
4. deals with the prevention and control of events that have the potential to release hazardous materials and energy,
5. such incidents can result in toxic exposures, fires or explosion, and other releases of hazardous energy,
6. could result in fatalities, injuries, property or environmental damage, lost production.

(Ref: Canadian Association of Petroleum Producer PSM Regulatory Scan 2014)

Process safety management is

1. the application of management principles and systems,
2. for the identification, understanding, avoidance, and control of process hazards,
3. to prevent, mitigate, prepare for, respond to, and recover from process-related incidents.

(Ref: CSA-Z767-17 PSM Standard)

Triggers

- Hazardous substances
- Risk of fire, explosion and toxicity
- Need of good design principles, engineering, and operating & maintenance practices

Process Safety hazards in SMEs

Municipal Facilities (examples)

- Ammonia refrigeration units for Ice Rinks
- Swimming Pool Chemical Storage (bleaches)
- Chemical Warehouses (pesticides, insecticides)
- Transit bus maintenance shops (EV, Hydrogen, Electrical, Diesel)
- Waste management
- Utility lines (water, sewer)

Management Systems

- Quality Management System (risk assessment)
- Environmental Management Systems (risk assessment)

Lifecycle of SME Facility

- Different phases of the lifecycle of a facility as per CSA Z767-17
 1. Conceptual design;
 2. Facility siting;
 3. Preliminary and process design;
 4. Detailed engineering design;
 5. Construction;
 6. Commissioning and start-up;
 7. Operations/maintenance;
 8. Revamps/modifications;
 9. Decommissioning; and
 10. Site closure.

Lifecycle of SME Facility

	Phase of facility	Permits	Title of Report	Regulatory Stream
1	Conceptual design;	-	-	-
2	Facility siting;	-	-	-
3	Preliminary and process design	-	-	-
4	Detailed engineering design;	Development Permit	Drawings and Engg. Schedules	Building Code/Fire Code
5	Construction;	Building Permit	Construction Site Fire Safety Plan/FRA	Building Code/Fire Code
6	Commissioning and start-up;	-	-	-
7	Operations/maintenance;	-	Fire Safety Plan	Fire Code
8	Revamps/modifications;	-	-	-
9	Decommissioning; and	-	-	-
10	Site closure.	-	-	-
(General municipal permitting process for a project of SME in Alberta)				

Suggested improvement

	Phase of facility	Permits	Title of Report	Regulatory stream
1	Conceptual design;	-	-	-
2	Facility siting;	-	-	-
3	Preliminary and process design	-	-	-
4	Detailed engineering design;	Development Permit	Drawings and Engg. Schedules Fire Protection Design Basis/FRA	Fire department regulations
5	Construction;	Building Permit	Construction Site Fire Safety Plan/FRA	Building Code/Fire Code
6	Commissioning and start-up;	Occupancy Permit	Operational Readiness Report	Fire department regulations
7	Operations/maintenance;	-	Fire Safety Plan (to be built on FRA)	Fire Code
8	Revamps/modifications;	-	FRA	Fire department regulations
9	Decommissioning; and	-	FRA	Fire department regulations
10	Site closure.	-	FRA	Fire department regulations

Special Mentions:

NFPA 551 – Guide for the Evaluation of Fire Risk Assessments (FRA)

CSCHE-PSM: Risk Assessment – Recommended Practices for Municipalities and Industry

Engineers Canada – Public Safety Guidelines on Risk Management

Objectives / Fire code

OS Safety

- An objective of this Code is to limit the **probability** that, as a result of specific circumstances related to the *building* or facility, a person in or adjacent to the *building* or facility will be exposed to an **unacceptable risk** of injury.

OH Health

- An objective of this Code is to limit the **probability** that, as a result of specific circumstances related to the *building* or facility, a person will be exposed to an **unacceptable risk** of illness.

OP Fire Protection of Buildings and Facilities

- An objective of this Code is to limit the **probability** that, as a result of specific circumstances related to the *building* or facility, the *building* or facility will be exposed to an **unacceptable risk** of damage due to fire.

Fire Safety Plan in Fire Code

Functional Statements	Objective Statements
<p>To minimize the risk of accidental ignition. F01</p> <p>To limit the severity and effects of fire or explosions. F02</p> <p>To retard the effects of fire on areas beyond its point of origin F03</p> <p>To facilitate emergency response. F12</p> <p>To notify emergency responders, in a timely manner, of the need to take action in an emergency. F13</p> <p>To minimize the risk of inadequate performance due to improper maintenance or lack of maintenance. F82</p>	<ul style="list-style-type: none"> - fire or explosion occurring (OS1.1) - fire or explosion impacting areas beyond its point of origin (OS1.2) - persons being delayed in or impeded from moving to a safe place during a fire emergency (OS1.5) - fire or explosion impacting areas beyond its point of origin (OP1.2)

Bottomline: Compliance with Fire Safety Plan requires a risk assessment and a fire protection design basis.

PSM Elements for SMEs

- Process Safety Leadership
 - Accountability
 - Regulations and Codes and Standards
 - Process Safety Culture
 - Conduct of Operations – senior management responsibility
- Understanding Hazards and risks
 - Process knowledge and documentation
 - Project review and design procedures
 - Process risk assessment and risk reduction
 - Human Factors
- Risk Management
 - Training and Competency
 - Management of Change
 - Process and equipment integrity
 - Emergency management planning
- Review and Improvement
 - Investigation
 - Audits process
 - Enhancement of process safety knowledge
 - Key performance indicators

Management System to consider (gap)

Required by regulations

Required by code

(analysis based on regulations in Alberta)

Conclusion

1. Fire Safety Plan in Fire Code can be used to follow-up on PSM in SMEs.
2. Fire Risk Assessments and fire protection design basis should be added to engineering drawings and assessments as a regulatory requirement in fire and building codes for industrial occupancies (group F) to assist Fire Safety Plan development.
3. Risk assessments in management systems should trigger remaining PSM elements in SMEs.
4. Engineers involved in construction codes should use CSA Z767, NFPA 551, Engineers Canada, and MIACC guidelines as guidance for conducting risk assessments, and developing engineering drawings for municipal permits, fire safety plans, and risk management plans keeping a focus on the lifecycle of SME (example integrated testing of building alarms).
5. Fire department regulations should be enhanced to include fire risk assessments and fire protection design basis for SME businesses that handle hazardous materials.

THANKS

Questions/Comments

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