



Emergency Services

Requirements for Heavy Industrial Developments

Date: January 2019

Overview

Strathcona County Emergency Services (SCES) reviews all the Heavy Industrial projects for compliance with Emergency Services [Bylaw](#), current Alberta Fire Code, and guidelines of Canadian Society for Chemical Engineering – Process Safety Management (CSCHE-PSM), also called Major Industrial Accident Council of Canada ([MIACC](#)) to ensure public safety and safety of emergency responders.

Definition of Heavy Industry: The industrial businesses dealing with major hazards and hazardous substances near or more than the threshold quantities determined by [MIACC List 1 and 2](#), and Environment Canada CEPA 2000 RMP [E2 list](#). Refer to Land Use Bylaw 6-2015 Section 1.17 [Definitions](#) for more details.

Please use the following list of requirements applicable to development projects in Strathcona County and submit the related documents for SCES review at respective stages indicated.

Stage	Document
A - Development	1 - Risk Assessment 2 - Fire Protection Plans 3 - Fire Protection Design Basis
B - Construction	4 - Construction Site Fire Safety Plan
C - Pre-Occupancy / Start-up	5 - Pre-Fire Plan 6 - Fire Safety Plan 7 - Pre-Start-up Safety Review (PSSR) 8 - Bow Tie Analysis 9 - Emergency Response Plan 10 - Industrial Response Worksheet 11 - Spill, Impairments and Notifications 12 - Emergency Preparedness Exercises
D - Occupancy	13 - Risk Management Programs

For general consultations about industrial facility, pipelines, and hazardous substances please contact Fire Prevention and Investigation at fireprevention@strathcona.ca or 780-449-9651.

Note: If no development permit is required, requirements 1 to 4 are to be provided before any development activity begins at the site. This will be determined based on the scope of project.

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A- Development Stage

The businesses identified as heavy industrial must conduct a Risk Assessment, as specified in the land-use [bylaw](#), and must be according to the information given below:

1. Risk Assessment

The documentation for describing the risk assessment must include as a minimum the following content:

- 1.1. Objectives of the analysis, including purpose and scope.
- 1.2. Description of the physical system, the surrounding land use including adjacent hazardous facilities, and stakeholders.
- 1.3. Description of the methodology for the following, including a statement of why the methods chosen are appropriate:
 - 1.3.1. Hazard identification and resulting hazardous events selected for detailed quantitative analysis; justification for selection of these events.
 - 1.3.2. Fire Modelling and consequence analysis, including all significant modelling assumptions and models used with justification, with references to technical publications as appropriate.
 - 1.3.3. Frequency analysis, including all significant assumptions and data sources; justification for selection of the methodology and data sources used.
 - 1.3.4. Risk estimation, including all significant simplifying assumptions.
- 1.4. A discussion on the limitations of the analysis, including sources of error, sensitivity of the results on the assumptions used, and level of uncertainty in the quantitative results.
- 1.5. Comparison of the quantitative results to the CSChE-PSM risk acceptability criteria (MIACC), if appropriate, with reference to any existing land use and adjacent hazardous facilities in the area.
- 1.6. Risk Reduction Analysis if the risk is not tolerable. This may trigger a detailed Process Hazard Analysis (HAZOP, LOPA, etc.) for the assessment of safety barriers in the design.
- 1.7. Conclusions and Recommendations; identifying whether there is need of an inspection, testing, and maintenance program.
- 1.8. Advisement: Please ensure the annual individual fatality risk in excess of the following maximum risk values along with their distances are included in the cumulative risk assessment and addressed in the 'Conclusions and Recommendations' section:
 - 1.8.1. Annual Individual Fatality Risk at 1:100,000
 - 1.8.2. Annual Individual Fatality Risk at 1:1,000,000, and

- 1.9. Advisement: Also use the 'Appendix: Assumptions and Approximations' available on the 'Hazardous Substances Risk Assessment: a Mini-Guide for Municipalities and Industry' in developing the scenarios for the MIACC risk assessment. This special mention is to consider and evaluate the annual individual fatality risk of 1×10^{-4} . At all times the annual individual fatality risk of 1×10^{-4} must not exceed beyond the property's fence (or property line).

For further details refer to: "Risk Assessment – Recommended Practices for Municipalities and Industry" by Canadian Society for Chemical Engineering – available at <http://www.cheminst.ca/psm>. For any questions please contact Fire Prevention and Investigation at fireprevention@strathcona.ca or 780-449-9651.

2. Fire Protection Plan:

The Fire Protection Plans must contain the following:

- 2.1. Diagrams highlighting fire hazardous areas and setbacks of facility layout and siting
- 2.2. Suitable diagrams, plans, schematics, and overviews are stamped by a Professional Engineer (Alberta)
- 2.3. Details of proposed indoor and outdoor storage of combustible and flammable materials outlining
 - 2.3.1. Details of electrical installations and hazardous area classification
 - 2.3.2. Fire prevention and protection measures
 - 2.3.3. Spill control and drainage systems
 - 2.3.4. Ventilation
 - 2.3.5. Handling of flammable and combustible liquids
- 2.4. Advisement on Siting: Ensure the siting of a proposed expansion or new plant considers the following:
 - 2.4.1. Buffer zones between the plant and the public;
 - 2.4.2. Worst credible scenarios for release of toxic chemicals, explosion or fire and the effect(s) on exposed groups;
 - 2.4.3. The exposure hazard to and from other plants or facilities in the area;
 - 2.4.4. Possible exposures due to natural events such as earthquake, flood, tornado, hurricane, subsidence, etc.;
 - 2.4.5. Effects of transportation of hazardous material feedstocks or products through local communities; and

- 2.4.6. Miscellaneous location information such as altitude, distance from the water body, land topography and meteorological conditions (e.g. direction and velocity of prevailing winds).
- 2.5. Advisement on Plot Plan: Ensure the Plot Plan of a proposed expansion or new plant considers the following:
 - 2.5.1. Congestion (e.g. overlapping hazard zones, difficult access, possible confinement of a vapor release, etc.);
 - 2.5.2. Location of control rooms, offices and other permanent and temporary buildings;
 - 2.5.3. Location of storage areas (e.g. tank farms, warehousing);
 - 2.5.4. Location of loading and unloading areas;
 - 2.5.5. Layout of drainage and location of containment areas;
 - 2.5.6. Proximity to hazards from other process areas;
 - 2.5.7. Proximity to public receptors beyond the site boundary;
 - 2.5.8. Federal, provincial and local regulations; and other applicable industry specific spacing guidelines.

3. Fire Protection Design Basis:

- 3.1. Firewater working plan with details on fire water supplies
- 3.2. Fire water demand as per realistic worst case fire scenarios
- 3.3. Available and proposed hydrant distances to nearby buildings and structures as per engineering codes and standards such as NFPA, API, etc., and Strathcona County Design and Construction Standards (where applicable)
- 3.4. Details of fire protection systems with applicable codes and standards used for the development of fire protection plans
- 3.5. Fire Protection Strategy (concise – 2 to 5 pages at most)
 - 3.5.1. Identify the strategy: offensive or defensive
 - 3.5.2. Must be maintained for the lifecycle of the facility
 - 3.5.3. Must ensure that protection of personnel is considered in the design of fire protection systems.
 - 3.5.4. Credible hazards have been identified, assessed, understood, and documented.
 - 3.5.5. Every opportunity to minimize the hazards has been identified, considered, and, where practical, implemented.
 - 3.5.6. Potential adverse effects on neighbors, community, and the environment are controlled.
 - 3.5.7. Demonstrate how it is integrated into the company's overall risk management philosophy.

Fire Protection Strategy is the systematic approach to identifying, reducing and managing the fire hazards. The fire protection strategy should be given to and used by a project team for expansions at the facility. A fire protection strategy should be developed for new projects, if one does not already exist. More guidance is available in the CCPS Fire Protection Guidelines.

B - Building Permit or Construction Stage

Note: If no building permit is required, Construction Site Fire Safety Plan is to be provided before any development activity begins at the site. This will be determined based on the scope of the development.

4. Construction Site Fire Safety Plan:

For the construction phase of the project a Construction Site Fire Safety Plan is required for emergency planning for the site and must include the following:

- 4.1. Must be site specific
- 4.2. Have action plans and instructions for emergency situations in accordance with Alberta Fire Code 2014 – Section 5.6., and include details of:
 - 4.2.1. Hazardous processes and operations
 - 4.2.2. Hot works at site
 - 4.2.3. Dust producing processes involved,
 - 4.2.4. Any special processes involving flammable and combustible materials.

A Construction Safety Plan, Site HSE plan or similar plans for the construction and demolition sites addressing the above mentioned content will be acceptable.

C - Pre-Occupancy Stage

5. Pre- Fire Plan

- 5.1. In accordance with industry best practices such as CCPS, API etc.
- 5.2. Use actual site details and site plans

Advisement: The documentation for pre fire planning may include, as a minimum, the following content:

- 5.3. Possible fire hazards (special concerns like BLEVE, boil-over, or water reactive chemicals) including review of hazardous material inventory.
- 5.4. Water supply availability
- 5.5. Water requirements (extinguishing, cooling, etc.)
- 5.6. Foam delivery requirements and capability
- 5.7. Typical weather concerns
- 5.8. Response requirements (personnel requirements, delivery equipment, and consumables such as foam, dry chemical carbon dioxide, etc.)
- 5.9. Mutual-aid organization capabilities, resources and response time.
- 5.10. Evacuation requirements
- 5.11. Communication needs
- 5.12. Scaled plot plan of the hazard and/areas potentially involved.
- 5.13. Scene severity
- 5.14. Accessibility to scene (having an alternative route in case access to the scene is blocked by rail cars or other equipment)
- 5.15. Decontamination facilities and procedures
- 5.16. Designation of staging areas
- 5.17. Major medical response
- 5.18. Industrial rescue capability
- 5.19. Areas with Asbestos
- 5.20. Location of radioactive instrumentation elements
- 5.21. Potential for polychlorinated biphenols (PCBs)
- 5.22. Safety concerns to firefighting personnel in having firefighting personnel standing by while a fire is burning itself out.
- 5.23. environmental, regulatory and community consequences of allowing a fire to burn itself out

For further details refer to:

CCPS, Guidelines for Fire Protection in Chemical, Petrochemical, and Hydrocarbon Processing Facilities, API RP 2001 Fire Protection in Refineries and other similar applicable standards

6. Pre-Start-up Safety Review

Be advised it is the responsibility of the applicant to have controls in place to ensure fabrication and installation of equipment corresponds to design intentions and specifications.

Each business/facility must ensure that a pre-startup safety review is completed before new or modified facilities are put into service.

Depending on the complexity of the project a Pre-Startup Safety Review will be required which must address the following:

- 6.1. Confirm that construction meets design specifications;
- 6.2. Ensure safety, operating, maintenance, and emergency procedures are in place and adequate;
- 6.3. Confirm that a process hazard analysis has been done and that recommendations have been resolved or implemented prior to start up;
- 6.4. Confirm that modified facilities meet the management of change requirements;
- 6.5. Ensure worker training has been completed; and
- 6.6. Ensure critical equipment has been identified and incorporated into a preventative maintenance program.

Be advised it is the responsibility of the business/facility to ensure project management controls are documented and form part of the project file.

7. Fire Safety Plan

This plan must be in accordance with applicable sections of Alberta Fire Code 2014 such as Section 2.8, 4.1.6.1, and 4.1.5.5. An appropriate fire hazard assessment must be conducted to develop the Fire Safety Plan.

Please submit the finalized Fire Safety Plan for SCES review at fireprevention@strathcona.ca.

8. Bow Tie Analysis

Depending on the complexity of the project a Bow-Tie Analysis will be required to support the development of site specific Emergency Response Plan. This bow tie is the combination of Fault

Tree Analysis and Event Tree Analysis expressed qualitatively in the barrier safety approach. This will be used for risk communication and development of emergency response plans.

The document must address the following:

- 8.1.1. Identify the realistic worst case major hazard scenarios to develop Bow-Tie-Diagrams
- 8.1.2. Include the Pre- and Post-incident safety barriers with details of both engineered and administrative controls. Ensure the technical summary of the proposed protective barriers is included
- 8.1.3. Enlist the consequences related to realistic worst case major hazard scenarios.

This document will be used towards the occupancy phase and will be a condition on the development permit. The actual document will not be required at the development permit application stage however is required to either develop a new ERP or update an existing one.

Some guidance is available at CCPS, Bow Ties in Risk Management: A Concept Book for Process Safety, AICHE, NY

9. Emergency Response Plan

In accordance with Federal and Provincial Regulations (e.g., NEB, AER) and good established practices such as CAN/CSA Z731 'Emergency Preparedness and Response' and CAN/CSA Z767-17 – 'Process Safety Management'. This is a requirement under Alberta Fire Code 2014 Section 2.8 Emergency Planning.

D - Occupancy Stage

10. Industrial Response Worksheet

SCES runs an Industrial Engagement Program in collaboration with the Heavy industrial Partners in the area to communicate site hazards to the emergency responders. The businesses are provided with a worksheet called Industrial Response Worksheet which works in conjunction to the Emergency Response Plans.

Complete the worksheet available [online](#), and send it to fireprevention@strathcona.ca.

11. Spills, Impairments, and Notifications

Contact 911 for any unsafe condition or spills that meet the following criteria:

Class	Quantity
Class 2: Gases, referred to in section 2.13(a) of the Federal Regulations*	Any quantity that could pose a danger to public safety or any sustained release of 10 minutes or more
`Flammable and Combustible Liquids' referred in Alberta Fire Code (NFPA Classification) Or Class 3: Flammable liquids and combustible liquids, referred to in section 2.18 of the Federal Regulations	50 Liters Please note Alberta Fire Code 2014 requirement of reportable quantity is 50 Liters which is different from 200 Liters required under federal regulations.
Class 4: Flammable solids, substances liable to spontaneous combustion, substances that on contact with water emit flammable gases (water-reactive substances), referred to in section 2.20 of the Federal Regulations	25 kg
Class 5.1: Oxidizing substances, referred to in section 2.24(a) of the Federal Regulations	50 kg or 50 L
Class 5.2: Organic peroxides, referred to in	1 kg or 1 L

section 2.24(b) of the Federal Regulations	
Class 6.1: Poisonous (toxic) substances, referred to in section 2.27(a) of the Federal Regulations	5 kg or 5 L
Class 6.2: Infectious substances, referred to in section 2.27(b) of the Federal Regulations	Any quantity
Class 8: Corrosives, referred to in section 2.40 of the Federal Regulations	5 kg or 5 L
Class 9: Miscellaneous products, substances or organisms, referred to in section 2.43 of the Federal Regulations	25 kg or 25 L

*Federal Regulations: Transportation of Dangerous Goods Regulations ([SOR/2016-95](#)) made under the Transportation of Dangerous Goods Act (Canada). Threshold quantities match the release reporting [regulations](#) of Alberta except for flammable and combustible liquids.

To report non emergent impairments of fire protection systems, notify Fire Prevention at fireprevention@strathcona.ca along with the impairment plan. For planned impairments please provide an impairment plan to fireprevention@strathcona.ca. The plan must be acceptable to SCES. In case of an emergency always call 911.

12. Drills, Preparedness Exercises, and Trainings

12.1. For emergency preparedness drills, exercises and trainings please contact emergencyservices@strathcona.ca to set up a time and to hold a preparedness session.

12.2. To submit the updates in ERP or questions related to ERP development, please contact emergencyservices@strathcona.ca

Note: For other non-emergent inquiries about industrial facility, hazardous substances, and/or pipelines please contact Fire Prevention and Investigation at fireprevention@strathcona.ca or 780-449-9651.

13. Risk Management Program

The heavy industrial businesses in 'Heavy Industrial Policy Area' and 'Heartland Policy Area' must have programs in place to aid in reducing potential risk hazards including education programs. Refer to [Land use Bylaw](#) for further details on regulations.

Following the land use bylaw and CSChE-PSM guidelines / MIACC, the business must have a Risk Management Program based on Process Safety Management (PSM). More guidance is available in the CSA Z767-17 – 'Process Safety Management Standard' and PSM publications of CSChE.

For questions, contact Fire Prevention and Investigation Division at fireprevention@strathcona.ca.

14. References:

1. Canadian Society for Chemical Engineering - [PSM Publications](#)
 - a. Risk-Based Land-use Planning Guidelines
 - b. Hazardous Substances Risk Assessment: A MiniGuide for Municipalities and Industry.
 - c. Risk Assessment Guidelines for Municipalities and Industries - An Initial Screening Tool (1997)
 - d. Risk Assessment – Recommended Practice for Municipalities and Industry (2004)
 - e. Process Safety Management Standard 1st Edition
 - f. Process Safety Management Guide – 4th Edition
 - g. Process Safety Management Audit Protocol Ver.1.01
 - h. Guidelines for Site Risk Communication
 - i. Site Self Assessment Tool
2. CCPS, Guidelines for Fire Protection in Chemical, Petrochemical, and Hydrocarbon Processing Facilities, AIChE, NY;
3. CCPS, Bow Ties in Risk Management: A Concept Book for Process Safety, AICHE, NY;
4. CSA Z767-17 Process Safety Management Standard;
(and many other)