



SAFETY CODES COUNCIL

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COUNCIL ORDER No. 0015402

ORDER

BEFORE THE BUILDING TECHNICAL COUNCIL

On March 27, 2012

IN THE MATTER OF the Safety Codes Act, Revised Statutes of Alberta 2000, Chapter S-1.

AND IN THE MATTER OF the seven (7) Orders dated June 8, 2011 issued by the Accredited Municipality (Respondent) against an Oil Company (Appellant).

UPON REVIEWING the seven Orders dated June 8, 2011 issued by Respondent against the Appellant **AND UPON HEARING** the Appellant and the Respondent; **THIS COUNCIL ORDERS THAT** the Order concerning:

1. Section 3.4. "Exits" of the Alberta Building Code 1997 (ABC 1997), is **REVOKED**.
2. Article 3.2.5.10. "Hose Connections" of the ABC 1997, is **REVOKED**.
3. Article 3.2.2.1. "Application" of the ABC 1997, pertaining to mezzanines, is **REVOKED**.
4. Article 3.2.2.1. "Application" of the ABC 1997, pertaining to loadbearing walls, columns, and arches, is **REVOKED**.
5. Article 3.2.2.1. "Application" of the ABC 1997, pertaining to floor assemblies, is **REVOKED**.
6. Article 3.2.4.1. "Determination of Requirement for a Fire Alarm System" of the ABC 1997, is **VARIED**.

From:

“You are hereby ordered to install a Fire Alarm System in the Boiler Feedwater/Combustion Turbine Building in accordance with the requirements of the Alberta Building Code 1997 Subsection 3.2.4. and any NFPA or CSA standards referenced therein by September 30, 2011.”.

To:

You are hereby ordered to obtain fire alarm verification certification without conditions in the Boiler Feedwater/Combustion Turbine Generator Complex (the Complex) by **October 1, 2012.**

7. Article 3.2.2.1. “Application”, of the ABC 1997, pertaining to sprinkler systems, is **VARIED.**

From:

“You are hereby ordered to sprinker the Boiler Feedwater/Combustion Turbine Building in accordance with the requirements of the Alberta Building Code 1997 and any NFPA standards referenced therein before September 30, 2011.”

To:

You are hereby ordered to increase the fire protection of the Boiler Feedwater/Combustion Turbine Generator Complex by installing fixed fire suppression and detection systems around the pumps on the main floor area of the boiler feedwater area, in accordance with the requirements of the *Alberta Building Code 1997* and any NFPA standards referenced therein by **November 30, 2012.**

Issue:

1. The Appeal concerns the Boiler Feedwater/Combustion Turbine Generator Complex (the Complex) at an Oil Facility (the Facility).
2. The issues on appeal are two-fold:
 - (a) What is the appropriate building classification of the Complex under Part 3 of ABC 1997?
 - (b) Have the fire protection features in the Complex been constructed in accordance with good fire protection engineering practice and in a manner that meets the intent of ABC 1997 with respect to fire protection and occupant safety?

The Record:

3. The following documentation was before the Appeal Panel:

- (a) Letter dated February 23rd, 2012, from the Coordinator of Appeals to the Appellant providing notice of the appeal hearing.
 - (b) Letter dated July 12, 2011, from the Building Technical Council to the Appellant granting a stay of the orders pending hearing.
 - (c) Letter dated July 7, 2011, from the Coordinator of Appeals to the Appellant acknowledging receipt of Notice of Appeal and the request for a stay of orders.
 - (d) Letter dated July 7, 2011, from the Appellant to the Safety Codes Council advising notice of appeal and requesting a stay of the orders.
 - (e) Seven orders issued by the Respondent to the Appellant on June 8, 2011.
 - (f) Report from the Appellant to the Safety Codes Council Tribunal - Volumes 1, 2, and 3.
 - (g) Appellant's Exhibit 1 – "Report to the Safety Codes Council Tribunal to Support the Appellants' Appeal" folder and power point presentation dated March 27, 2012.
4. The Appeal Panel considered all relevant materials comprising the record of this proceeding, including the evidence and argument provided by each party. References in this decision to specific parts of the record are intended to assist the reader in understanding the Appeal Panel's reasoning relating to a particular matter and should not be taken as an indication that the Appeal Panel did not consider all relevant portions of the record with respect to that matter.

Position of the Parties

Appellant

5. The Appellant's position is that:
- (a) The appropriate classification for the Complex is either:
 - i. Group F, Division 3, One Storey, Any Area, Low Fire Occupancy, or
 - ii. Special and Unusual Structure.
 - (b) The Complex has a very low occupant load with non-typical occupancy where occupants have direct communication link with emergency services, are mobile, aware of escape routes, and receive specialized training in emergency operating procedures, standard operating procedures, oil sands safety, construction or petroleum safety, and H₂S gas monitoring.
 - (c) An on-site, fire brigade can respond to a fire in less than five (5) minutes.
 - (d) The Complex has multiple independent egress options and exit times are under two minutes.

- (e) Relocation of hose connections to exits to address Order #2 is impracticable and very little benefit is gained.
- (f) The Complex is low fire hazard, non-combustible building construction. There is minimal fire risk and very low fire loading on upper levels with only steam and water handling equipment and HVAC units at top level. Fire modelling engineering reporting demonstrated no significant impact to building structure.
- (g) Retrofitting the Complex is extremely difficult and expensive with minimal increase in life safety.
- (h) As a proposed alternative solution, the Appellant is installing a fire suppression system around the boiler feed water pumps. This mitigates increased travel distance risk and provides a reasonable equivalent level of safety.
- (i) Occupancy permits can be granted for the four buildings: Water Treatment, Auxiliary Boiler, Steam Turbine, and Gas Compression, which are not subject to this appeal.
- (j) The Appellant requests that the Safety Codes Council revoke all seven orders.

Respondent

6. The Respondent's position is that:

- (a) The appropriate classification for the Complex is Group F, Division 2, any Height, Any Area, Sprinklered.
- (b) The Complex is not a Special and Unusual Structure. The Complex has five storeys, walls and stairwells.
- (c) Compliance with the seven (7) Orders issued ensures timely movement of persons to a safe place in an emergency, facilitates emergency response and retards the effects of fire on the Complex.
- (d) Compliance with the Code limits the probability that a person in or adjacent to a building or facility will be exposed to an unacceptable risk of injury as a result of inadequate built-in protective measures for the current use of the building/facility due to fire or explosion occurring or impacting areas beyond its point of origin.

Findings of Fact:

7. All areas of Alberta are subject to the laws, codes, and regulations of the *Safety Codes Act*.

8. The *Safety Codes Act* provides:

52(2) The Council may by order

- (a) Confirm, revoke or vary an order, suspension or cancellation appealed to it and as a term of its order may issue a written variance with respect to any thing, process or activity related to the subject-matter of the order if in its opinion the variance provides

approximately equivalent or greater safety performance with respect to persons and property as that provided for by this Act.

9. The applicable code is the Alberta Building Code 1997(ABC 1997). The Appellant was issued a building permit in December 2006, when the Alberta Building Code 1997 was in force.

10. The Alberta Building Code 1997 provides:

1.1.3.2. Defined Terms

Building – means any structure used or intended for supporting or sheltering any use or occupancy.

Building height (in storeys) – means the number of storeys contained between the roof and the floor of the first storey.

Floor area – means the space on any storey of a building between exterior walls and required firewalls, including the space occupied by interior walls and partitions, but not including exits, vertical service spaces, and their enclosing assemblies.

Industrial occupancy – means the occupancy or use of a building or part thereof for the assembling, fabricating, manufacturing, processing, repairing or storing of goods and materials.

Low hazard industrial occupancy (Group F, Division 3) – means an industrial occupancy in which the combustible content is not more than 50 kg/m² or 1200MJ/m² of floor area.

Medium hazard industrial occupancy (Group F, Division 2) means an industrial occupancy in which the combustible content is more than 50 kg/m² or 1200 MJ/m² of floor area and not classified as high hazard industrial occupancy.

Major occupancy – means the principal occupancy for which a building or part thereof is used or intended to be used, and shall be deemed to include the subsidiary occupancies which are an integral part of the principal occupancy.

Occupancy – means the use or intended use of a building or part thereof for the shelter or support of persons, animals or property.

Occupant Load – means the number of persons for which a building or part thereof is designed.

Storey – means that portion of a building which is situated between the top of any floor and the top of the floor next above it, and if there is no floor above it, that portion between the top of such floor and the ceiling above it.

3.1.16.1. Occupant Load Determination

- 1) The occupant load of a floor area or part of a floor area shall be based on
 - a) the number of seats in an assembly occupancy having fixed seats,

- b) 2 persons per sleeping room in a dwelling unit, or
- c) the number of persons for which the area is designed, but not less than that determined from Table 3.1.16.1. for occupancies other than those described in Clauses (a) and (b), unless it can be shown that the area will be occupied by fewer persons.

Table 3.1.16.1

Type of Use of Floor Area or Part Thereof	Area per person m ²
Industrial uses	
Manufacturing or process rooms	4.60

3.2.1.1. Exceptions in Determining Building Height

7) A service space in which facilities are included to permit a person to enter and to undertake maintenance and other operations pertaining to building services from within the service space need not be considered a storey if it conforms to Articles 3.2.5.15. and 3.3.1.23., and Sentence 3.2.4.19.(12), 3.2.7.3.(2), 3.3.1.3.(7), 3.4.2.4.(3) and 3.4.4.4.(9). (See Appendix A.)

3.2.2.2. Special and Unusual Structures

1) A structure which cannot be identified with the characteristics of a building in Articles 3.2.2.20. to 3.2.2.83. shall be protected against fire spread and collapse in conformance with good fire protection engineering practice. (See A-3, A-3.2.2.2.(1) and A-3.2.5.13(1) in Appendix A.)

3.2.2.67 Group F, Division 2, Any Height, Any Area, Sprinklered

1) Except as permitted by Articles 3.2.2.68. to 3.2.2.72., a building classified as Group F, Division 2 shall conform to Sentence (2).

2) Except as permitted by Articles 3.2.2.16., the building referred to in Sentence (1) shall be of non-combustible construction, and

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the building shall be sprinklered throughout,
- b) floor assemblies shall be fire separations with a fire-resistance rating not less than 2 h,
- c) mezzanines shall have a fire-resistance rating not less than 1 h, and
- d) loadbearing walls, columns and arches shall have a fire-resistance rating not less than that required for the supported assembly.

3.2.2.82 Group F, Division 3, One Storey, Any Area, Low Fire Load Occupancy

1) A building classified as Group F, Division 3 is permitted to conform to Sentence (2) provided it is

- a) not more than 1 storey in building height,
- b) used solely for low fire load occupancies such as
 - i) power generating plants, or
 - ii) plants for the manufacture or storage of non-combustible materials, and
- c) not limited in building area.

2) The building referred to in Sentence (1) shall be of noncombustible construction.

3.4.1.1. Scope

1) Exit facilities complying with this Section shall be provided from every floor area which is intended for occupancy.

3.4.1.2. Separation of Exits

1) Except as permitted by Sentence (2), if more than one exit is required from a floor area, each exit shall be separate from every other exit leading from that floor area.

2) If more than 2 exits are provided from a floor area, exits are permitted to converge in conformance with Sentence 3.4.3.2.(2), provided the cumulative capacity of the converging exits does not contribute more than 50% of the total required exit width for the floor area.

3.4.2.5. Location of Exits

1) Except as permitted by Sentences (2), (3) and 3.3.2.4.(6), if more than one exit is required from a floor area, the exits shall be located so that the travel distance to at least one exit shall be not more than

f) 30m in any floor area other than those referred to in Clauses (a) to (e)

3.4.4.1. Fire-Resistance Rating of Exit Separations

1) Except as permitted by Sentences (2), 3.3.5.4.(3), 3.4.4.2.(2) and 3.4.4.3.(1), every exit shall be separated from the remainder of the building by a fire separation having a fire-resistance rating not less than that required by Subsection 3.2.2., but not less than 45 min, for

a) the floor assembly above the storey, or

b) the floor assembly below the storey, if there is no floor assembly above.

11. The subject of the appeal is the Complex located at the Facility. The main floor area of the combustion turbine generator is 1300 sq. m, and the main floor area of the boiler feedwater is 1150 sq. m for a total of 2450 sq. m. The service levels 2, 3, 4, 4 ½ , and 5 of the boiler feedwater encompasses 2204 sq. m. (The Record Item 3(g), Slide 21)
12. The Complex is one of five units at the Facility. The other units, which are not subject to this appeal, are the Water Treatment Building, the Auxiliary Boiler Building, the Steam Turbine Building, and the Gas Compression building.
13. In 2004 the Appellant commissioned an engineering firm to design the Facility to supply power to the Oil Plant.
14. For design purposes the engineering firm classified the Complex as Group F (Industrial), Division 3 (low hazard), One Storey, Any Area, Low Fire Load Occupancy building. (The Record 3(f) Volume 3, Tab 6, Black & Veatch mechanical drawings)
15. The Appellant was issued one building permit in December 2006 for the entire Facility. (The Record Item 3 (f) Volume 3, Tab 1)

16. In June 2007 a site inspection was performed by the accredited agency. The inspection report did not identify any code violations. (The Record Item 3 (f), Volume 3, Tab 1)
17. When the Complex was completed in February 2009 the Appellant requested an inspection of the Facility to obtain an Occupancy Permit.
18. On July 28, 2009 the accredited agency inspected the Facility and observed 13 deficiencies in the construction of the Facility and determined that the appropriate classification for the Facility was Group F (industrial), Division 2 (medium hazard), Any Height, Any Area, Sprinklered. Based on the classification by the Respondent, the Occupancy Permit was not issued. The Respondent sent the inspection report with a covering letter to the Appellant on August 17, 2009. (The Record Item 3 (f) Volume 3, Tab 2)
19. Following the inspection of July 28, 2009, the Appellant commissioned a Risk Assessment and Control company to address the deficiencies identified in the Respondent's inspection report and to evaluate each building and determine whether the fire safety issues identified by the inspection were addressed and mitigated by safety measures included in the building designs.
20. In December 2010 the Appellant submitted applications for variances to address deficiencies identified by the Respondent at the Complex.
21. In January 2011 the Respondent advised the Appellant that variances would not be granted for the deficiencies at the Complex.
22. In April 2011 the Appellant advised the Respondent that the Appellant did not intend to address the remaining deficiencies as indicated by the Respondent, and that the Appellant would proceed to appeal.
23. On June 8, 2011 the Respondent issued seven (7) orders pertaining to the Complex.
24. The Complex is industrial use and is low hazard. The combustible materials as indicated in the engineering report do not exceed 50 kg/m². The Complex encompasses a main floor area plus five service levels. Two egress paths exist from each level with an alternate egress path on the fourth level.
25. The combustion turbine is identified as the main fire hazard in the Complex.
26. The function of the Complex is primarily conducted on the main floor area and the upper service areas are used for temporary and occasional maintenance.
27. The equipment of the Complex is designed to operate unattended and is periodically occupied by service staff for maintenance and shutdown activities. Maximum occupancy load is 25 for the boiler feedwater and 20 for the combustion turbine generator, for a total of 45. (The Record Item 3 (f) Volume 3, Tab 7)

28. Occupant load determination requirements of the ABC 1997, is based on the number of persons for which the area is designed, but not less than that determined from Table 3.1.16.1.
29. Table 3.1.16.1 of the ABC 1997, determines that for a structure of 2450 square metres, the occupant load is 532 persons, or separately 250 for the boiler feedwater and 282 for the combustion turbine generator. The main floor area of the Complex is 2450 square metres; 1150 square metres for the boiler feedwater and 1300 square metres for the combustion turbine generator.
30. The occupant load is not proportional to the building area. The number of persons for which the area is designed is less than the threshold determined by the occupant load Table 3.1.16.1. of the ABC 1997.
31. The engineering reports submitted by the Appellant, which the Appeal Panel accepts, indicate that typical travel times for egress vary from 12 seconds on the main floor area of the boiler feedwater structure to 106 seconds from the 5th level service area. (The Record, Item 3(f), Volume 3, Appendix 12)
32. The Appeal Panel accepts the smoke modelling engineer report of March 12, 2012, which indicates that without fire suppression around the combustion turbine, the stairway closest to the fire becomes untenable in a 6m x 8m spill fire scenario, and the other stairway remains tenable. (The Record, Item 3(f), Volume 3, Appendix 16)
33. The Appeal Panel finds that the existing connections for a 65 mm diameter hose and hose cabinets with 38 mm diameter hose installed on every level of the Complex, near each stair are acceptable as existing on site. (The Record, Item 3(f), Volume 1, Page 28)
34. Fire protection engineering, provided by the Appellant, of lube oil fire modeling of the boiler feedwater area indicates that a potential lube oil pool fire and a torch fire are small enough in area to not significantly affect the structure. The Appeal Panel notes that the fire protection modeling was performed in accordance with Society of Fire Protection Engineers (SFPE) guidelines and accepts that such fires would not significantly affect the Complex. (The Record, Item 3(f), Volume 3, Appendix 13)
35. A fire alarm system is installed in the Complex in the boiler feedwater area and the combustion turbine area. Verification certificates were obtained by the Appellant in 2008 for the fire alarm system. (The Record, Item 3(f), Volume 3, Appendix 10)
36. As an alternative solution to sprinklering the Complex (Order #7), the Appellant is committed to installing fire suppression systems around each of the four pumps in the boiler feedwater main floor area.

Reasons for Decision:

37. The Appeal Panel is satisfied that the Complex is appropriately classified as Special and Unusual Structure, Group F, Division 3, low hazard industrial occupancy compliant with article 3.2.2.2. of the ABC 1997.
38. The Complex cannot be readily identified with the descriptions of buildings in Articles 3.2.2.20. to 3.2.2.83 of the Alberta Building Code 1997. A special and unusual structure indicates a structure that cannot be readily identified. The Complex has several buildings and together these buildings form a structure that operates together to supply power to the Oil Plant. In determining the fire safety requirements of a building in relation to each of the major occupancies contained therein, building height and building area of an entire building are used. At the Complex, the multiple service levels are for accessing equipment and maintenance and are not considered floor levels or mezzanines. The concept of a service level not considered a floor level is noted in the current building code commentaries as service areas used only for worker access. In Sentence 3.2.1.1. (7) of ABC 1997 service spaces need not be considered as storeys. Without the service levels classified as floor levels the building is only one storey in building height. What remains in determining fire safety requirements, is to decide code classification Group F Division 2 or Group F Division 3. That classification is best determined by combustible content. The combustible content of the Complex is less than 50 kg/m² or 1200 MJ/m² of floor area indicating that the structure is Group F, Division 3. Fire safety requirements of the Complex are addressed by good engineering practice and fire modelling.
39. In applying the requirements of Part 3 of the ABC 1997 it is intended that the requirements be applied with discretion to buildings of unusual configuration that do not clearly conform to specific descriptions of buildings. Appendix A-3 of the ABC 1997 provides examples of structures used in industry that do not readily follow the specific requirements of Part 3. Examples provided are industrial uses involving steel mills, aluminum plants, refining, power generation and liquid storage facilities. The provisions of Part 3 for fire protection features installed in buildings are intended to provide a minimum acceptable level of public safety. It is intended that all fire protection features of a building, whether required or not, will be designed in conformance with good fire protection engineering practice and will meet the appropriate installation requirements in relevant standards. Good design is necessary to ensure that the level of public safety established by the Code requirements will not be reduced by a voluntary installation. Although the Appendix is not a mandatory section of the Code, it does contain additional explanatory information to assist Code users in understanding the intent of the requirements contained in Parts 1 to 11.
40. With the classification of Special and Unusual Structure, and the determination of low hazard, the prescriptive requirements of article 3.2.2.67. for Group F (industrial), Division 2 (medium hazard), Any Height, Any Area, Sprinklered do not apply to the Complex.
41. Exit facilities complying with Section 3.4. of the ABC 1997 (Order #1), are not required for industrial occupancy that is limited to periodic use by service staff. The highest occupant load at one time for the Complex is diminutive and below the occupant load determination of table

3.1.16.1 of the ABC 1997. Areas of industrial occupancy, occupied periodically by service staff, do not require the same type of exit facility as floor areas occupied on a continuing basis.

42. The ABC 1997, article 3.4.2.5. allows for a maximum 30 m travel distance to at least one exit if more than one exit is required from a floor area. Again, the prescriptive application of Part 3 to a special and unusual structure is done with discretion. The Appeal Panel noted that although the travel distance to at least one exit in the Complex is more than 30 m, the persons exiting the Complex are mobile, familiar with the Complex, aware of potential hazards, and are trained in emergency operating procedures, standard operating procedures, oil sands safety, construction or petroleum safety, and H₂S gas monitoring. In addition, the Complex is served by fire fighting personnel with a response time within five (5) minutes.
43. The ABC 1997 article 3.2.5.10 “Hose Connections” in its prescriptive approach does not apply to the Complex (Order #2). In revoking the requirement for smoke-rated exits (Order #1), compliance with article 3.2.5.10. in its prescriptive approach is not required. Hose connections are installed in the Complex near each stair and hose cabinets are installed close to stairs at all levels. The combustion turbine is identified as the only fire hazard at the Complex, and fire risk is mitigated with the installation of a fire suppression system. Although the installation of a fire suppression system initiates the requirement for a standpipe system and hose connections, once again the classification of Special and Unusual Structure provides that the prescriptive nature of the requirements of Part 3 of the ABC 1997 are applied with discretion to buildings of unusual configuration. Instead a reasonable approach, providing a minimum acceptable level of public safety, designed in conformance with good fire protection engineering practice, is intended.
44. Orders #3, #4, and #5 affect the application of building fire safety pertaining to the building size and construction relative to occupancy. Once again, the application of requirements of Part 3 of the ABC 1997 is directed with discretion when applying requirements of fire protection, occupant safety and accessibility to a special and unusual structure. The multiple service levels are not designed as occupied levels except to be used to service equipment. The Appeal Panel gave weight to the Appellant’s fire protection modelling report and noted that the modelling was performed in accordance with Society of Fire Protection Engineers (SFPE) guidelines.
45. The ABC 1997 article 3.2.4.1. directs that a fire alarm system shall be installed in a structure that has an automatic sprinkler system installed (Order #6). With the installation of the fire suppression system around the combustion turbine, a fire alarm system is required to provide a minimum acceptable level of public safety. The Appellant installed a fire alarm system in the Complex in both the boiler feedwater area and the combustion turbine area. In varying Order #6, the Appeal Panel is directing the Appellant to obtain certification of fire alarm verification without conditions and within a reasonable amount of time.
46. With the installation of fire suppression and detection systems around the combustion turbine, the level of protection is increased and mitigates risk from the identified fire hazard. With respect to the Complex, the Appeal Panel accepts, as a variance to Order #7, that the Appellant will install fire suppressions and detection systems around the combustion turbine to mitigate any risk that the hazard may cause.

47. The Risk, Assessment and Control company engineering reports submitted by the Appellant adequately address the level of protection and egress requirements that meet the intent of the ABC 1997. The Appeal Panel accepts the Risk, Assessment and Control company engineering reports as good fire protection engineering practice.
48. The Appeal Panel is satisfied that the Complex is one structure. The exterior walls of one unit do not distinguish it from another unit. There is no spatial separation of the units. The units share a common wall. The common wall as constructed has no fire performance rating. The units are all on the same property, have one owner and are used for the same occupancy.

Appeal Panel Comment:

49. The Appeal Panel observed a cooperative relationship between the Appellant and the Respondent and noted that the parties' non-adversarial approach allowed for the unimpeded delivery of information and testimony throughout presentations and cross-examinations.

Dated at Edmonton, Alberta this 29th day of May, 2012

Chair, Building Technical Council Appeal Panel