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Re: Status of Spearmint Red Egret Application

At the present the application has two core issues of incompleteion that prevents issuance of a building permit.

1. Large-scale Fire Test (LSFT) report/data and FPE supplemental report

The 2023 NFPA 855 requires a supplemental report to be submitted along with the complete large-scale fire test report and the supporting data for the large-scale fire test report. NFPA 855 then goes on to require the test report to be accompanied by a supplemental report to interpret the test data in relation to the installation. In NFPA 855 this report is clearly separate from the HMA, it is part of the large-scale fire test reports and serves a different purpose.

The HMA is required to address failure modes and how they were addressed, it can rely on the large-scale fire test report and the supplemental FPE report, but they serve two different purposes.

> **2023 NFPA 855**
> **4.4 Hazard Mitigation Analysis (HMA).**
>
> **4.4.1***
> A hazard mitigation analysis shall be provided to the AHJ for review and approval where any of the following conditions are present:
>
> (1) Technologies not specifically addressed in Table 1.3 are provided
>
> (2) More than one ESS technology is provided in a single fire area where adverse interaction between the technologies is possible
>
> (3) Where allowed as a basis for increasing maximum stored energy as specified in 9.4.1.1 and 9.4.1.2
>
> (4) Where required by the AHJ to address a potential hazard with an ESS installation that is not addressed by existing requirements
>
> (5) Where required for existing lithium-ion ESS systems that are not UL 9540 listed in accordance with 9.2.2.1
>
> (6) Where required for outdoor lithium-ion battery ESS systems in accordance with 9.5.2.1
>
> **4.4.2 Failure Modes.**
> **4.4.2.1***
> The hazard mitigation analysis shall evaluate the consequences of the following failure modes and others deemed necessary by the AHJ:

(1) A thermal runaway or mechanical failure condition in a single ESS unit

(2) Failure of an energy storage management system or protection system that is not covered by the product listing failure modes and effects analysis (FMEA)

(3) Failure of a required protection system including, but not limited to, ventilation (HVAC), exhaust ventilation, smoke detection, fire detection, fire suppression, or gas detection

After repeatedly insisting contrary to the 2024 IFC and the 2023 NFPA 855 that the large-scale fire test and the supplemental FPE report were not required, it was identified to the applicant that even the locally adopted ordiance required the large-scale fire test.

NFPA 855 is clear on what gets submitted as part of the large-scale fire test and report.

2025 NFPA 855
9.1.5 Fire and Explosion Testing.

9.1.5.2* Test Reports.

9.1.5.2.1
The complete test report and its supporting data shall be provided to the AHJ for review and approval.

9.1.5.2.2
The test report shall be accompanied by a supplemental report prepared by a registered design professional with expertise in fire protection engineering that provides interpretation of the test data in relation to the installation requirements for the ESS.

During the last videoconference with the applicant their position was they wanted to include the missing submittals in an updated HMA such as the separate FPE analysis of the Large-Scale Fire Test report and data required by the 2023 NFPA 855: Our repsponse at that time was if that was their plan they needed to add quite a bit of detail to the HMA to meet the intent of NFPA 855.

Attached are two examples of FPE prepared supplemental reports for the large-scale fire test as examples of what detail is expected, the current applicant HMA on file does not meet this stamdard of care.

2. NFPA 69 Combustible Concentration Reduction system

The applicant included a TUV report as an appendix to the HMA with the assertion that the TUV report documented the code compliance of the planned NFPA 69 combustible concentration reduction system. This system is a core safety system should a thermal runaway event occur because the danger of a deflagration along with the hydrogen by volume possibility of a deflagration to detonation transformation.

Our initial review of the TUV report identified the following deficiencies:

Appendix D NFPA 69 Report: The document from TUV is not acceptable for the following reasons:

1. It was not prepared by or under seal and signature from the FPE of record for the project.
2. It does not comply with all requirements from NFPA 69. (Only refers to a single chapter)
3. It relies on the UL 9540A Module level test, a test that is inadequate for identifying potential severity of an event.
4. It models only 5 cells from a 26 cell submodule.
5. It incorrectly states that propagation does not occur module to module.

6 It doesn't provide any information on what CFD model was used.
7. It does not include any limitation information on the application of the CFD model.
8. CFD models assume box shapes, squares and rectangles. The inside of the BESS is more complicated with numerous channels for gas dispersion, the CFD submittal is required to explain how that issue is overcome.
9. For references the CSA Cell Level Report is referred to as well as the TUV Module and Unit Level Reports, however, as identified above, the TUV reports refer to a UL Cell Level Report.

Throughout the process the applicants team insisted there was nothing wrong with the TUV report, contrary to the identified deficiencies which includes not addressing requirements found in Chapters 4, 6 and 15 of NFPA 69.

Applicants position during the last videoconfernce was that the HMA would include the missing information, but they would still rely on the TUV report.

Coffman Engineering added a small amount of information to the HMA without including any of the missing CFD data. We informed them at the last videoconference that the HMA needed much more detail, for example, it was identified that TUV only provided minimal comments on Chapter 8 of NFPA 69, there are requirements in Chapters 4, 6, 8, and 15 that need to be specifically address. Coffman Engineering only addresses a total of 6 sections from those 4 chapters.

For example, NFPA 69 requires the following:

6.4 Plans.
6.4.1
Plans, system specifications, and manufacturer's recommendations for testing and maintenance shall contain information that enables the authority having jurisdiction to evaluate the explosion hazard and the effectiveness of the system.

We don't have plans specific to the NFPA 69 system and all the applicable NFPA 69 requirements, we have an invalid TUV report, we have minimal coverage in the HMA, we have the gas detecors tied in with the fire alarm plans, but none for the NFPA 69 system as a whole.

It was identifed that the TUV did not include any information on the CFD modeling utillized, its parameters and how known limitations in the CFD model were addressed, a neccessity for review. Coffman Engineering has not supplied that. The TUV Modeling for the NFPA 69 system indicates they simply did a volumetric model versus cubic feet per minuite (CFM) exhaust fan amounts. Based on the images in the TUV report they assumed all produts of thermal runaway off-gassing rise when the industry knows from testing and actual events that some off-gas prioducts rise, some products sink and some off-gas products stratisfy.

That is severly insufficient, the internal movement of of the off-gas products of thermal runaway to ensure the gas detector is located in a postion for sensing the products at 10% LFL, a citical factor in design analysis. That hasn't been provided even though we identified to the applicant that the specification sheet for the Li-on Tamer gas detector to be utilized identfies that the detector must be located based upin downstream convective air streams. Since the BESS is liquid cooled, what is that air stream the gases are assumed to follow?

The modeling is supposed to show the exhaust air movement into the BESS and its path to the exaust point to uidentify that all areas and spaces within the BESS are swept by the incoming area to avoid a combustible gas level of 25% LFL anywhere in the BESS. NFPA 855 addresses this.

2023 NFPA 855

9.6.5.6.8

Compartmentalization created by cold and hot aisle arrangements within the ESS enclosure shall be addressed in accordance with the following:

(1) For NFPA 69 designs, the performance of ventilation systems shall be independently verified for a thermal runaway event in either aisle/subcompartment.

(2) For NFPA 68 designs, the placement of explosion relief panels shall ensure that the explosion hazard is addressed for both hot and cold aisles/subcompartments.

(3) The gas detection system shall be designed to activate on detection of flammable gas in either aisle/subcompartment.

And the design must address that the event cannot propaget thrusystem interconnections. No information has been provided on this.

2023 NFPA 855
9.6.5.6.9
The protection design shall demonstrate that deflagrations are not propagated to interconnected or adjacent cabinets, enclosures, or rooms.

All missing details.

The applicant has suggested that Coffman Engineering simply use the TUV repirt as part of their submittal, the first problem with that is we have identified serious deficiencies with the TUV report that have not been acknowledged must less addressed. The second problem is that NFPA 69 is not a listing standard for a an approved laboratory (NRTL) to test and list. NFPA 69 is a design standard.

As a design standard, not a listing standard, a Texas licensed registered design professional (FPE) must be responsible for preparing the submitted design of the NFPA 69 system, not a NRTL located in China.

2024 NFPA 69

1.1 Scope.
This standard applies to the design, installation, operation, maintenance, and testing of systems for the prevention of explosions by means of the following methods:

…
(2) Control of combustible concentration
…

Two example CFD modeling reports produced by registered design professionals are attached.

Sincerely,

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