

BESS RISK ASSESSMENT WHITE PAPER

JENSEN HUGHES STUDY

OBJECTIVE: The objective is to assess the alignment of the BESS installations with the applicable provisions of the 2021 International Fire Code (IFC) Section 1207 (as adopted by New Jersey) and best practice guidance from NFPA 855. As such, there was no site inspection or independent verification of installed systems. The study did not include testing, hazard modeling or field verification. The review was limited to Atlantic City Electric (ACE) documents and publicly available documents provided by the Borough. **BHTA questions how this study is an independent review.**

PROJECT OVERVIEW: The Project Overview includes a description that flood risks on a barrier island required mitigation. It states that the location is a mixed use area near residences and commercial businesses (pg. 3). Yet, the study did not go any further in terms of the associated location and its hazards. Fire detection is provided via smoke, thermal, and gas detection devices connected to a Fire Alarm Control Panel (FACP) located in the control/equipment room but no mention is made of the emergency response plan (ERP). Fire suppression within the enclosure consists of a Novec 1230 clean agent fire suppression system designed to protect sensitive electrical equipment without water damage. The clean agent system is activated automatically upon confirmed fire detection. A plumbed water deluge system is also provided, which can be supplied through one of two fire department connections (FDCs) located outside the enclosure if supplemental suppression with water is required. **However, water cannot extinguish lithium-ion fires and the installed equipment is a lithium-ion battery.**

The Study states that the BESS is located less than 100 feet from buildings, lot lines, public ways, stored combustible materials, hazardous materials, high-piled stock, and other exposure hazards, and therefore is considered an outdoor near-exposure installation per IFC §1207.8.2. Yet, the only hazard mentioned was flooding.

COMPLIANCE GAP REVIEW: It was stated the ERP did not include equipment standard listing and it was later provided by ACE. There was no hazard mitigation analysis or hazard mitigation scenarios. ACE provided its own BESS Safety Analysis Report. **The lack of independent oversight is concerning.** There was no large scale sequence fire test documentation provided. ACE provided Cell, module, and unit levels UL 9540A testing. **Again, the lack of independent oversight is concerning.** There was no commissioning/ decommissioning strategy provided. ACE provided Commissioning and decommissioning procedures as described in "Operating Manual" & "Operating Procedures", "UL Field Evaluation", and "BESS Safety Analysis Report",

but no stand alone report was provided. **Again, the lack of independent oversight is concerning (pg. 11).**

An Energy Management System description report was not provided and ACE had to provide the Safety Analysis Report. **Again, the lack of independent oversight is concerning (pg. 12).** The Study requested fire-resistance test/listing documentation for the installed barrier assembly that is referenced in the ERP. The wall assembly documentation furnished by ACE indicated a wall assembly that would meet or exceed a 2-hour fire resistance rating. **Again, the lack of independent oversight is concerning (pg. 13).** Explosion control documentation was requested. ACE furnished "Hitachi BESS Runaway Gas Concentrations in Ventilated Enclosures". **Was this reviewed for compliance?** There was no evidence that thermal runaway protection was provided until ACE provided documentation that shows protections been evaluated using batteries furnished by ACE. ERP does not provide training provisions for operations staff, emergency responders and coordination with the fire department on drills.. Training procedures are described in the "Pre-Fire Plan (PFP)" and "Emergency Operation Plan (EOP)" which were furnished by ACE. **That it is not contained in the BESS ERP is concerning.**

RISK CONSIDERATIONS: Study agrees that the The lithium-ion battery chemistries in use (NCA, NCM, LMO) remain susceptible to thermal run producing high heat release rates, flammable gases, and visible open flames. There are gaps in documentation related to thermal propagation testing. Additionally, UL's field evaluation identified non-conformances which represent both fire and electrical hazards if left uncorrected and further increase uncertainty about the installation's ability to contain or limit fire growth (pg. 19). **What is especially concerning with these statements is that no mention is made regarding the location close to residencies and commercial businesses.**

RECOMMENDATIONS. While, the Study indicates that Recommendation #1 of full scale fire testing has been satisfied, it is understood that testing and performance documentation for the gas detection system and explosion prevention system were not verified. **This means that the system's reliability in detecting and mitigating explosive concentrations cannot yet be confirmed. While a water-based suppression system was documented, it is my understanding that water can not control lithium-ion fires.**

While Recommendation #2 has been satisfied regarding documentation of an explosion prevention system, the current design includes a Novec 1230 clean agent system for the battery enclosure. **While clean agents are suitable for specific energized electrical hazards, they present limitations in lithium-ion battery applications. Clean agents cannot cool batteries undergoing thermal runaway, meaning re-ignition or continued propagation is possible after discharge.**

While Recommendation #3, indicates replacement or augmenting the clean agent suppression system with a water-based suppression solution compatible with lithium-ion hazards, **we have seen evidence that water cannot control lithium-ion fires.**

While Recommendation #4 has been satisfied related to detection layout, design compliance and specifications, **hazard signage was also not verified in the reviewed materials, meaning that responders or the public may lack critical information (battery type, hazard warnings, emergency contact information) at points of entry.**

Recommendation #5 has not been fully implemented regarding emergency response preparedness. **No information was provided on the frequency of emergency drills, responder training, or validation of FCC operations under live conditions. Without recurring training and testing, responder familiarity with the unique site hazards (elevated platform, FCC functions, manual deluge activation) cannot be assured.**

Recommendation #6 has been satisfied regarding documenting training frequencies in coordination with fire department personnel. **The Study indicates the barrier island location introduces flood hazard considerations, as well as environmental implications for fire, water, and runoff. Water used for suppression will require containment and potentially hazardous waste handling due to contamination with electrolytes and other battery byproducts. Nonetheless, ACE documentation only addresses water intrusion into the enclosure and associated ventilation systems during severe weather conditions.**

Recommendation # 7 was not fully addressed as specific documentation addressing environmental response actions/spill containment/runoff management was not identified in the material reviewed. ACE stated that the enclosure was designed using a 135 mph design basis wind speed and incorporates weather-resistant construction features.

CONCLUSION

This is not an independent oversight study and is disappointing in evaluating the risks of BESS on a coastal barrier island. The location close to residences and businesses was not mentioned as relevant risk requiring mitigation. The review did not examine independent material. It accepted materials provided by ACE, BESS manufacturer or the Borough. "Details and/or information not presented or provided on the documentation provided by the Client are not considered a part of this analysis."