FINDINGS AND CORRECTIVE ACTIONS
SEPT. 4, 2021, INCIDENT
MOSS LANDING ENERGY STORAGE FACILITY

On the evening of Sept. 4, 2021, the water-based battery heat suppression system activated at the Phase I battery system of the Moss Landing Energy Storage Facility owned and operated by a wholly owned subsidiary of Vistra Corp. The ensuing incident caused damage to roughly 7% of the facility's battery modules and to other facility systems. There were no injuries or community impacts from the incident.

Vistra has prioritized safety as it conducted, in coordination with its outside experts, a five-month long investigation into the incident and developed corrective actions currently being implemented prior to a restart of the facility. Throughout this process, Vistra committed to share its learnings from the incident in order to support the battery storage energy industry and the shared goal of decarbonizing the electric system. The following is a description of the principal findings and corrective actions.

1. Background on Design of the Moss Landing Phase I Battery Heat Suppression System

The 300-megawatt facility includes three 100-MW arrays. Each array consists of 32-33 cores, each of which is made up of 47-48 racks containing 22 battery modules. Altogether, the facility has a total of 99,858 modules in 4,539 racks making up 98 cores.

The building housing the Phase I battery system has a fire suppression system, including sprinkler pipes. In addition, a separate water-based heat suppression system protects against thermal runaway in individual battery modules. This system includes 25 preaction zones throughout the facility, each of which services 3-4 cores. The preaction zones consist of carbon steel header pipes that are connected by flexible hoses to piping on each rack. The rack piping includes sprinkler nozzles that are inserted into each battery module.

The design calls for release of water to the header pipes in a particular zone upon detection of a certain level of smoke by the Very Early Smoke Detection Apparatus (VESDA). After release to the header pipes, water will then be injected into a battery module if the temperature in that module becomes sufficiently elevated to activate the nozzle in that module.

Conditions in and around the battery modules are continuously monitored, including the temperatures in each module.

2. Findings Related to the Sept. 4 Incident

At approximately 6:41p.m. on Sept. 4, smoke was detected by VESDA units in the vicinity of cores 64, 57, 47 and 41, causing water to be released to preaction zone 24 and stopping the flow of electrical current through the affected cores (an automated process referred to as E-Stop). Due to an apparent programming error in the VESDA, these actions occurred at detected smoke levels below the specified design level at which water was intended to be released and E-Stop was intended to be initiated.

The only identified potential source of smoke that has been identified is an air handling unit, which supplied air to the area where smoke was detected and which experienced a failed bearing (which could have led to smoke generation) around the time smoke was first detected by the VESDA.

At the time water was first released to the heat suppression system, all battery module temperatures were recorded as within established temperature limits and well below the level that would indicate a thermal runaway. Accordingly, we do not believe that the battery modules were the source of smoke.

During the incident, a small number of couplings on the flexible hoses and pipes that were part of the battery heat suppression system experienced failures that resulted in water spraying on the battery racks. This in turn resulted in short circuiting and arcing, which caused battery damage and more smoke. This additional smoke was detected by other VESDA units, resulting in release of water to other preaction zones, followed by hose/pipe failures, release of more water and more damage and smoke. Vistra is not aware of any fire within the building, and the facility's separate fire suppression system was not activated.

In all, approximately 7% of the modules were damaged to varying degrees, along with damage to other facility systems. This damage was caused by the water released from the heat suppression system along with the resulting short circuiting and arcing. Some of the water was sprayed directly onto the battery racks, and some of it leaked through gaps in the upper floor onto battery racks located on the lower floor.

Before they were connected to each other, the preaction header piping and the piping on each battery rack underwent separate pressure testing. However, Vistra has been unable to confirm that the contractor pressure tested the complete heat suppression system after the racks were connected to the header pipes. The majority of failures were experienced at flexible hoses that connected the racks to the header pipes and that apparently were not pressure tested. As noted below, the connectors will be pressure tested prior to restart to ensure proper performance.

3. Corrective Actions

Vistra is in the process of conducting repairs, commissioning facility systems, and implementing enhancements to improve the original design of the facility. In addition, Vistra will complete the following corrective actions prior to restarting Phase I of its Moss Landing facility:

a. The complete heat suppression system will be pressure tested, and any identified leaks will be addressed.
b. An air supervision system will be installed to continuously monitor for leaks in the heat suppression system.
c. The VESDA system will be reviewed to ensure it is programmed in accordance with the specifications.
d. Smoke detectors will be installed in all air handling units.
e. Gaps in the upper floor will be sealed.