



Canadian Solar SolBank 3.0 Energy Storage System

EMERGENCY RESPONSE PLAN

Rev. 0 | November 7th, 2024

Summary

This document serves as the product-specific Emergency Response Plan (ERP) for the Canadian Solar SolBank 3.0 stationary storage battery system.

This ERP provides information and instructions to guide first responders in preparing for, and safely responding to, an incident, fire, or other emergency associated with the SolBank 3.0 BESS.

LIFE SAFETY SHALL BE THE HIGHEST PRIORITY DURING ANY TYPE OF EVENT.

Prepared For:

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EXAMPLE EMERGENCY CONTACT INFORMATION

IN CASE OF EMERGENCY CALL 911

Local Fire Department

Phone:

Address:

Local Police Department

Phone:

Address:

Local Hospital (Level 1 or 2 Trauma)

Phone:

Address:

EXAMPLE Additional Site Contact Information

System Owner/Operator

Phone: (XXX) XXX-XXXX

Email: Email

Subject Matter Expert

Phone: (XXX) XXX-XXXX

Email: Email

Central Station

Phone: (XXX) XXX-XXXX

Address: Address

Electric Company

Phone: (XXX) XXX-XXXX

Address: Address

ENERGY STORAGE SYSTEM INFORMATION

EXAMPLE ENERGY STORAGE FACILITY



ENERGY STORAGE SYSTEM

Make / Model: CSI e-Storage SolBank 3.0

Total MW / MWh: ## MW / ## MWh

kW / kWh per Unit: 2350 kW / 4700 kWh

Units:

FIRE DETECTION SYSTEM

Each enclosure is equipped with smoke, heat, and gas detection devices.

Alarm signals are sent to Central Station and to the Fire Alarm Control Panel at the Fire Command Center (FCC). Audible and visual alarms are triggered at the FCC and the troubled enclosure.

FIRE SUPPRESSION SYSTEM

There is no external or internal fire suppression system provided (or required for an outdoor non-enterable installation).

EXPLOSION PROTECTION

An exhaust fan and fresh air louvers activate to exhaust any flammable gases before an explosive atmosphere can develop within the enclosure.

WATER SUPPLY

A ##,### gallon water tank is provided on-site.

PROJECT INFORMATION

Project Name	Canadian Solar SolBank 3.0 Emergency Response Plan
Project No.	24-20470
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REVISION HISTORY

Revision No.	Date of Issue	Substance of Change
Rev. 0	11/7/2024	Draft issue

Note 1: The information in this document is subject to change while in DRAFT status and may be modified in the event of modifications to equipment or other factors affecting the design of the system or site.

Note 2: During the operating life span of the project, it is expected that documents shall be reviewed annually, and that all pertinent information shall be appropriately updated as necessary. This ERP is compiled based upon current design and usage at the time of this writing.

Note 3: Highlighted information to be finalized prior to construction.

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Energy Safety Response Group LLC (ESRG) is providing an as-built final revision of this document based on an “as-built” system. This document should not be provided externally until agreed by all responsible parties.

The industry, related technology, and best practices are rapidly evolving and changing regularly. It has been observed that changes often occur to a project through the construction phase, be they to the battery itself or to the balance of system. As such, an “as-designed release” document should be considered final only if no changes are made to the system from design to construction to completion. If it is 100% accurate it will be released unchanged. However, should ESRG encounter deviations from the design, the document will be amended accordingly per the design changes and then released as a final document.

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DEFINITIONS

ACRONYMS

AR	Arc-Rated
BMS	Battery Management System
COD	Commercial Operations Date
E-Stop / EPO	Emergency Stop / Emergency Power Off
ERP	Emergency Response Plan
EMS / ESMS	Energy Management System / Energy Storage Management System
ERG	Emergency Response Guide (generic, product-level emergency response guide)
ESRG	Energy Safety Response Group
ESS / BESS	Energy Storage System / Battery Energy Storage System
FACP	Fire Alarm Control Panel
FCC	Fire Command Center
FDC	Fire Department Connection
IC	Incident Commander
ICP	Incident Command Post
ICS	Incident Command System
kW	Kilowatt(s)
kWh	Kilowatt-hour(s)
LFL / LEL	Lower Flammability Limit / Lower Explosive Limit
LFP	Lithium Iron Phosphate
LOCA	Letter of Conditional Acceptance
MW	Megawatt(s)
MWh	Megawatt-hour(s)
NCA	Nickel Cobalt Aluminum Oxide
NMC	Nickel Manganese Cobalt Oxide
O&M	Operations and Maintenance

PCS	Power Conversion System
PPE	Personal Protective Equipment
SCBA	Self-Contained Breathing Apparatus
SDS	Safety Data Sheet
SME	Subject Matter Expert
SOC	State of Charge
UC	Unified Command
UFL / UEL	Upper Flammability Limit / Upper Explosive Limit

ROLES AND RESPONSIBILITIES

Site Owner	The owner of the premises upon which the battery system is installed.
Site Operator	The entity responsible for site operations.
Incident Commander (IC)	The person responsible for the overall management of the incident and determines which Command or General Staff positions to staff in order to maintain a manageable span of control and ensure appropriate attention to the necessary incident management functions.
Subject Matter Expert (SME)	A person appointed by the site owner or operator to respond to the Fire Department technical requests or questions about the battery system.
Remote Monitoring Facility / Operations Center	Facility providing 24/7 remote monitoring of the battery Energy Storage Management System (ESMS) and provides notification to the System Owner and battery manufacturer.

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1 INTRODUCTION

1.1 Scope and Purpose

This Emergency Response Plan (ERP) is provided for the Canadian Solar SolBank 3.0 battery energy storage system (ESS or BESS). The purpose of this document is to provide guidance and pertinent information regarding the roles, responsibilities, and chain of communication and command of the System Owner / Operator, Property Owner, and other required Subject Matter Experts (SMEs) for preparing for, and safely responding to, a fire, explosion, or other battery-related incident requiring a public safety response at the energy storage facility utilizing the SolBank 3.0 ESS.

“On-site personnel” include all individuals on the facility property who are direct employees of the Owner / Operator or affiliated contractors. The Owner / Operator and contractors are similarly responsible for establishing and maintaining contractor-specific Emergency Response Plans and reporting procedures that will work in conjunction with the overall energy storage facility plan.

Life safety shall be the highest priority during any type of event.

1.2 Timeframe

This Emergency Response Plan covers the timeframe beginning at final approval of the local permitting Fire Department to the finalization of decommissioning and removal of the energy storage system.

1.3 Activation

This Emergency Response Plan shall be activated during any emergency response to a battery-related incident on site.

1.4 Agency Jurisdiction

This plan has been strictly developed for the responding Fire Department(s) and does not cover multi-agency response.

1.5 Incident Command System (ICS)

The Subject Matter Expert shall integrate into the Incident Command System (ICS) for an emergency.

The SMEs, Remote Monitoring Facility staff, and all energy storage system related personnel shall comply with the orders of the Incident Commander (IC) and the Command Staff.

1.6 Operations and Maintenance (O&M)

Normal O&M procedures for the energy storage facility and associated equipment are outside the scope of this document. This ERP, however, is applicable to this facility during construction, commissioning, and throughout the project's lifespan.

Please refer to manufacturer Operations and Maintenance manuals for all associated equipment related to the site prior to beginning any work on this installation.

1.7 ERP Update Process

1.7.1 **Issuance and Revisions**

Dates for draft issuance, revisions, and final issuance of this ERP are provided on page 5 of this document.

1.7.2 **Updates and Document Maintenance**

Updates to this ERP based on any major material changes to the installation are the responsibility of the System Owner / Operator and any other relevant entities. All revisions to this ERP shall be recorded in alignment with [Section 1.7.1](#) above.

1.7.3 **Annual Review**

During the operating lifespan of this installation, it is expected that this document shall be reviewed annually, with all pertinent information updated as required. A log of regularly scheduled annual reviews is provided in [Appendix C](#) of this document.

1.7.4 **Plan Retirement**

All decommissioning procedures should be performed by trained and knowledgeable persons in alignment with the Decommissioning Plan provided for this installation. Decommissioning shall be performed under supervision of the System Owner / Operator responsible for this installation.

Notification of decommissioning shall be provided to the Fire Department by the System Owner / Operator and/or Subject Matter Expert responsible for this installation.

2 SITE DESCRIPTION

2.1 Site Location

Site-specific Information including site location and layout; fire department access and staging area; and water supply to be provided here.

3 ENERGY STORAGE SYSTEM

The BESS facility will utilize the SolBank 3.0 ESS units, each rated approximately 2350 kW with a two-hour discharge duration, providing a total of approximately ## MW / ## MWh of facility energy storage power and capacity to the electrical grid. Each SolBank unit contains 48 battery modules, each consisting of 104 Lithium-Iron Phosphate (LFP) battery cells.

Each SolBank unit is equipped with an explosion prevention system designed to exhaust any flammable gases released during battery failure before an explosive atmosphere can develop within the enclosure.

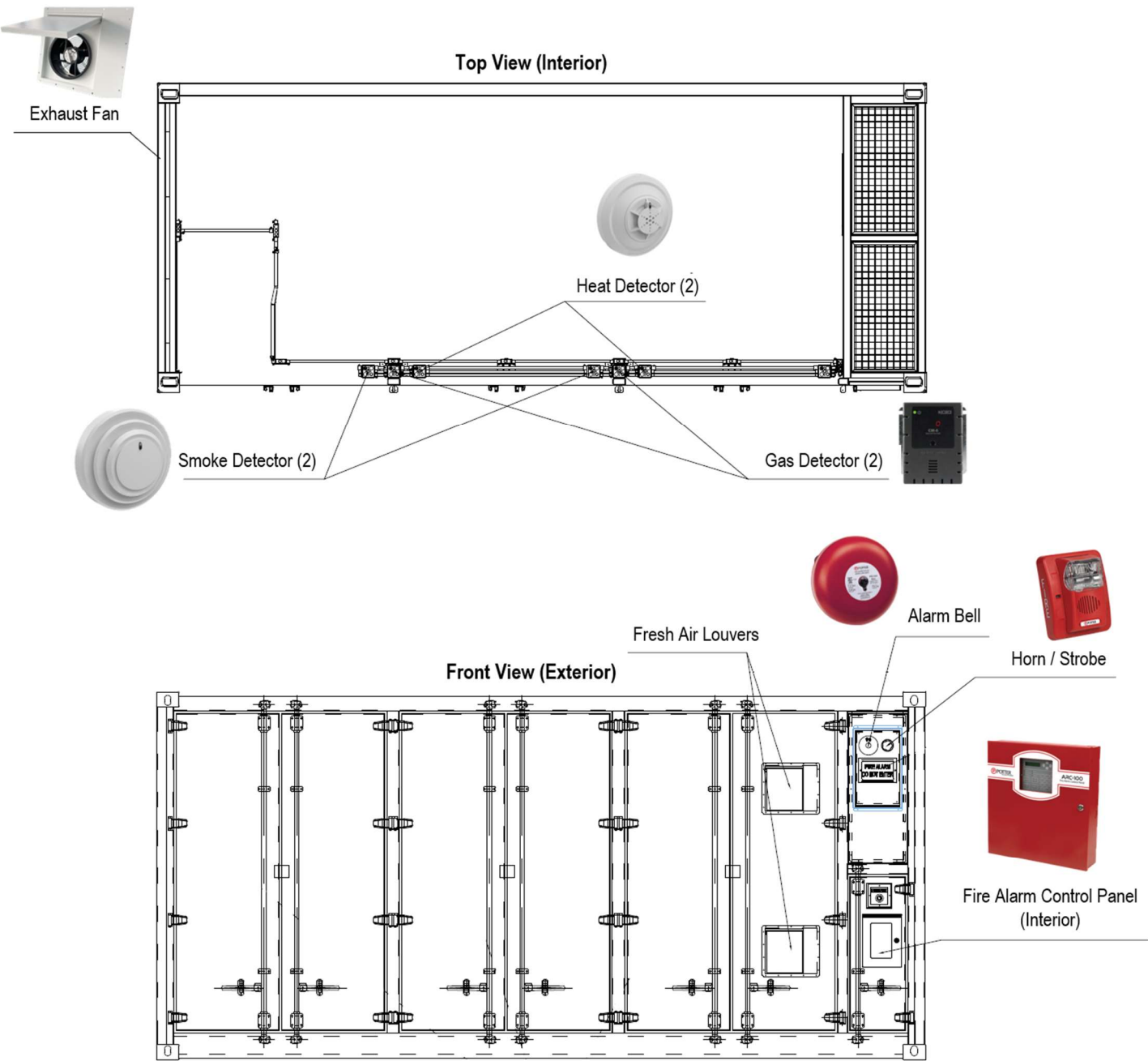
Smoke, heat, and gas detection devices are provided within each SolBank enclosure. Devices are connected to a centrally monitored Fire Alarm Control Panel (FACP) and to audible and visual notification devices.

The locations of the SolBank fire protection systems are shown in Figure 2. Additional information on these systems is provided in [Section 4](#) and [Section 5](#).

Figure 1 – Typical SolBank 3.0 ESS Unit



Figure 2 – SolBank Fire Protection Systems



4 FIRE PROTECTION FEATURES

4.1 Gas Detection and Explosion Protection

Each SolBank enclosure is equipped with an explosion prevention system designed to exhaust the flammable byproducts of cell off-gassing that may be generated during a potential failure condition. Flammable gases will be detected by two (2) combustible gas detectors within the enclosure. There are two alarm levels initiated by the gas detection system, each triggering specific actions:

Level 1 Alarm (10% LEL)

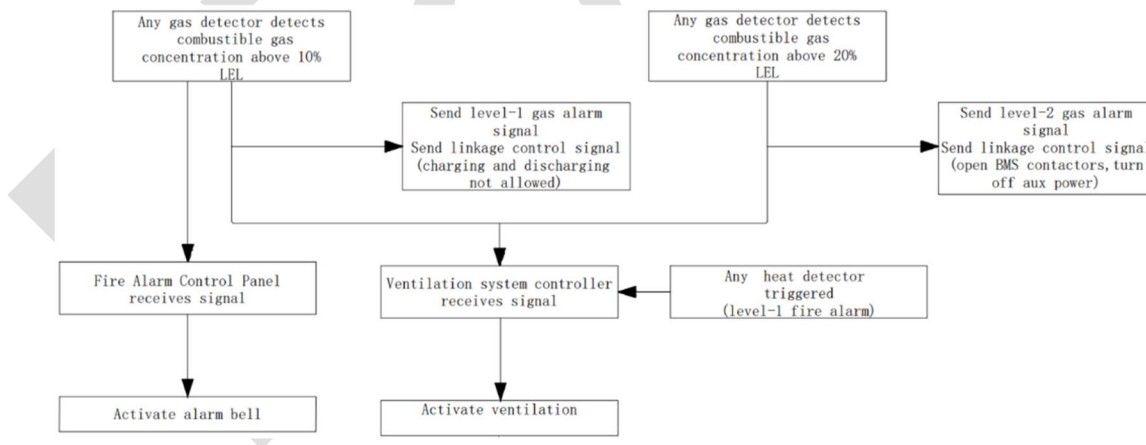
- Signal to FACP
- Activate alarm bell
- Activate explosion prevention system
- Stop battery charging/discharging

Level 2 Alarm (20% LEL)

- All Level 1 Alarm actions
- Open BMS contactors
- Turn off auxiliary power

The explosion prevention system consists of an 820 cubic feet per minute (CFM) exhaust fan and fresh air louvers. Once activated by the gas detectors, the louvers will open, and the fan will exhaust flammable gas concentrations from the enclosure. The explosion prevention system will also activate if a heat detector within the enclosure is triggered (heat detection is further detailed in [Section 5](#)). A Level 2 Alarm condition will not remove auxiliary power from the explosion prevention system. Each container is also outfitted with a battery backup capable of operating the explosion prevention system if auxiliary power is lost. A flowchart for explosion prevention system operation is shown in Figure 3.

Figure 3 – Explosion Prevention System Flowchart



WARNING: Risk of Re-ignition



Do **NOT** assume the fire is out as the fire event unfolds. A lithium-ion battery fire, which has seemingly been extinguished, may flare up again if all cells within the enclosure have not been completely consumed. The risk of battery re-ignition can remain present for hours or even days after the smoke / flame is initially detected.

WARNING: Risk of Explosion / Deflagration	
	An explosion / deflagration / overpressure event is a critical hazard, and any emergency on site should always be addressed with full awareness of potential factors which may lead to such an event. <u>Any failure or alarm condition should result in the assumption of an explosion risk.</u>
WARNING: Electrical Shock Hazard	
	In case of flooding, stay out of the water if any part of the SolBank unit(s) or wiring is submerged.

4.2 Emergency Shutoffs

Emergency shutoffs are provided at multiple levels, though the Fire Department should not engage with E-Stops, as ESS shutdown may adversely affect the electrical grid.

The Fire Department should not engage with E-Stops, as ESS shutdown may adversely affect the electrical grid. Any interaction with E-Stops should only be initiated in coordination with the System Owner / Operator and other SMEs, as deemed necessary.

4.2.1 Automatic E-Stop

Automatic shutdown is provided at different levels for the SolBank ESS units, depending on the type of failure:

- Faults detected within battery cells, modules, or strings result in automatic electrical isolation via the BMS.
- When system current and/or voltage are operating outside of permissible values, the SolBank enclosure contains electrical fault protection devices. Additionally, the inverter/PCS includes protections and automatic disconnects.

4.2.2 Site-Level E-Stop

Information on a site-level Emergency Stop (E-Stop) to be provided here, if specified.

The Fire Department should not engage with E-Stops, as ESS shutdown may adversely affect the electrical grid. Any interaction with E-Stops should only be initiated in coordination with the System Owner / Operator and other SMEs, as deemed necessary.

4.2.3 Enclosure-Level E-Stop

Each SolBank unit is equipped with two Emergency Stop (E-Stop) buttons, one at each end of the enclosure. The enclosure-level E-Stop is to be used only by authorized maintenance or operations personnel.

In the event of a battery-related failure, the Fire Department should not approach any battery enclosures or engage with any enclosure E-Stops.

CAUTION: Risk of Stranded Energy	
	Shutting off power to the SolBank unit(s) does not de-energize the battery and shock hazard may still be present. Always treat the batteries as Energetic Hazardous Materials, as they may maintain their State of Charge (SOC) long after the removal of power to the overall ESS.
WARNING: Risk of Fire and Explosion	
 	Risk of fire or explosion may be present in the event of a battery failure. The Fire Department should not attempt to engage with any site or enclosure E-stops. Assistance in shut down should be provided by the System Owner / Operator and any other required SMEs.
WARNING: Electrical Shock Hazard	
	In case of flooding, stay out of the water if any part of the SolBank unit(s) or wiring is submerged.

4.3 Battery Management System (BMS)

An integrated Battery Management System (BMS) monitors key datapoints such as voltage, current, and state of charge (SOC) of battery cells and provides control of corrective and protective actions in response to any abnormal conditions. Each battery string – consisting of four battery modules each – is equipped with a dedicated BMS. A SolBank-level controller supervises BMS output from each individual string. In the event of any abnormal conditions, the BMS will generally first raise an information warning, and then trigger a corresponding corrective action should certain levels be reached. Critical BMS sensing parameters include:

- Over / under temperature limits
- Over / under voltage limits
- Over / under current limits
- Communications loss

5 FIRE DETECTION, ALARMING, AND NOTIFICATION

5.1 Fire Detection

In addition to gas detection ([Section 4](#)), each SolBank enclosure is equipped with two (2) smoke detectors and two (2) heat detectors. Smoke detectors are calibrated to an alarm sensitivity of 3.5%/ft and heat detectors are calibrated to an alarm threshold of 185°F. Backup power to the detectors is provided via batteries within the enclosure FACP.

There are two alarm levels initiated by the smoke and heat detectors, each triggering specific actions (Figure 4):

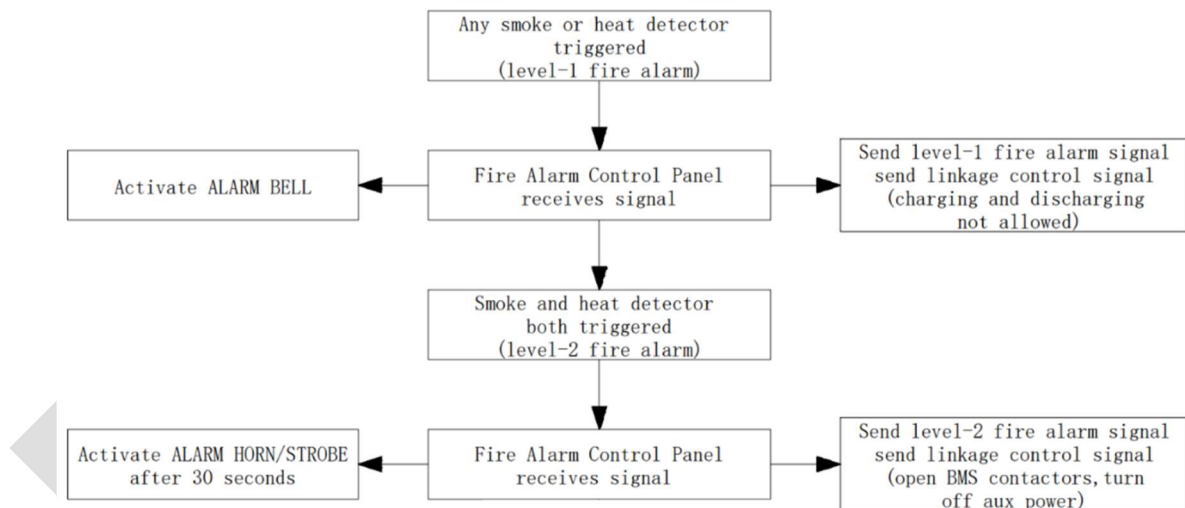
Level 1 Alarm (Smoke OR Heat)

- Signal to FACP
- Activate alarm bell
- Stop battery charging/discharging

Level 2 Alarm (Smoke AND Heat)

- All Level 1 Alarm actions
- Activate horn/strobe (30 sec. delay)
- Open BMS contactors
- Turn off auxiliary power

Figure 4 – Fire Detection System Flowchart



5.2 Central Station Monitoring (If Specified)

In the event of smoke, heat, or gas detection within the SolBank enclosures, the FACP shall send alarm signals to the Central Station which shall then be relayed to the local responding Fire Department who shall coordinate dispatch of FD units.

Table 1 – Central Station Monitoring Facility Information

Central Station Monitoring Information

- To Be Finalized

5.3 Remote Monitoring Facility

In addition to Central Station monitoring, remote monitoring of BMS operation is provided by the Remote Operations Center. In the event of a battery-related failure transmitted by the BMS, alarm notifications and other pertinent information on the state of the ESS shall be sent to the System Owner / Operator and battery manufacturer to inform potential emergency response procedures, as needed.

Additionally, if more detailed information on the state of the SolBank units is required, the Remote Operations Center should be contacted.

Table 2 – Remote Operations Center Information

Remote Operations Center (for Emergency Use)
▪ 24/7 Emergency Contact: +1 (###) ###-####
▪ Email Support: If applicable

6 HAZARDS ASSOCIATED WITH LI-ION BATTERY ESS

Lithium-ion battery failures pose several major risks, as are briefly described in the sections below. Specific response procedures for different incident scenarios are provided in [Section 8](#) of this document.

6.1 Thermal Runaway

The defining characteristic of lithium-ion battery failures is an event known as thermal runaway. Thermal runaway is a chemical process where self-heating in a battery exceeds the rate of cooling causing high internal temperatures, melting, off-gassing / venting, and in some cases, fire or explosion. Thermal runaway can be caused by thermal, mechanical, and electrical abuse; an internal short circuit from manufacturing defects; or the development of metallic dendrites over time that form an internal short circuit.

Flammable and potentially explosive gases – generally white in color – typically evolve when an ESS goes into thermal runaway and may be released in large quantities from battery cells or modules. Fire and explosive incidents may result, and precautions described in the following sections should be observed.

6.2 Fire and Re-ignition

Lithium-ion battery fires burn extremely hot (upwards of 1,000 – 1,500°C) and are generally not easily extinguished. Fire growth may be slow, fast, or ultra-fast (e.g., during a deflagration event) in nature, and may last for several hours before the battery modules are completely consumed. Furthermore, even when a lithium-ion battery fire appears to be fully extinguished, the risk of re-ignition may still be present hours or even days after there are no visible signs of fire.

Application of water directly to affected battery modules is not recommended and may potentially prolong the incident. In the event of a non-battery related fire or incipient fire, the decision to apply water should be made in coordination with the System Owner / Operator and any other required SMEs.

NOTICE	
	Indicators which may provide insight into what is happening or about to happen during an incident may include: ▪ Smoke or flames ▪ Changes in smoke color ▪ Changes in velocity or volume of smoke production ▪ Sounds – popping and / or hissing ▪ Smell – sweet odor

WARNING: Risk of Re-ignition	
	Do NOT assume the fire is out as the fire event unfolds. A lithium-ion battery fire, which has seemingly been extinguished, may flare up again if all cells within the enclosure have not been completely consumed. The risk of battery re-ignition can remain present for hours or even days after the smoke / flame is initially detected.

6.3 Explosion

Lithium-ion batteries release flammable off-gases during thermal runaway which, if allowed to accumulate within the enclosure, may create an explosive atmosphere, posing serious risk to first responders and nearby exposures. These gases may accumulate within the ESS enclosure at levels above the Lower Explosive Limit (LEL). At sufficiently high accumulations, gases can also exceed their Upper Explosive Limit (UEL), at which point ventilation may bring the environment back into flammable limits, creating a new explosion risk.

It may be difficult to discern conditions within the enclosure if smoke and gas are not visible outside of the enclosure. Furthermore, a single battery cell may release enough flammable off-gas to generate an explosive atmosphere within the enclosure. Therefore, any failure or alarm condition should always result in the assumption of a potential explosion risk.

WARNING: Risk of Explosion / Deflagration	
	An explosion / deflagration / overpressure event is a critical hazard, and any emergency on site should always be addressed with full awareness of potential factors which may lead to such an event. <u>Any failure or alarm condition should result in the assumption of an explosion risk.</u>

6.4 Electric Shock

Even if a battery may look to be destroyed by fire and / or other means, there is potential that the battery still contains stranded energy and remains energized. De-energization of the system or any removal of the battery or battery components shall only be performed by a trained and competent individual with appropriate PPE.

Normal overhaul of the ESS enclosure should not be attempted by the Fire Department under any circumstances, as there are considerations for handling damaged batteries requiring equipment and expertise not readily available. Once the scene is secured, these actions may be undertaken by trained experts under close supervision.

WARNING: Risk of Stranded Energy	
	Always treat the batteries as Energetic Hazardous Materials, as stranded energy is likely to remain present. Traditional Fire Department overhaul should not be conducted due to the potential for stranded energy.

6.5 Arc Flash

All ESS components and related electrical equipment shall always be treated as energized (Energetic Hazardous Material).

Appropriate PPE and training are required when working or accessing equipment within an Arc Flash Boundary. In general, when in direct proximity of the battery enclosure, wear a non-melting or untreated natural fiber long-sleeve shirt, long pants, safety glasses, hearing protection, and leather gloves. AR plant clothing is also acceptable. Maintain the Arc Flash Boundary until completion of any particular task.

6.6 Toxic Smoke and Gas Emission

Lithium-ion batteries may release large quantities of flammable and toxic gas when undergoing failure and pose an inhalation hazard. Materials and chemicals consumed during a thermal runaway event will produce copious amounts of smoke.

The ESS site perimeter should not be entered during a fire or off-gassing event unless there is an imminent threat to life safety, at which time only properly trained and equipped public safety personnel may enter. This entry shall be with full firefighter protective gear including a self-contained breathing apparatus (SCBA).

A fog pattern from a handline or monitor nozzle may be an effective way to control the off-gassing event on the exterior of the battery container from migrating to unwanted areas. However, if water is used in extinguishing flames, these gases can become acids which may cause skin irritation.

WARNING: Toxic Gases	
	Large quantities of toxic smoke and gas may be emitted from the ESS during battery off-gassing or fire situations. <u>Proper PPE including SCBA should be worn by first responders.</u>
NOTICE	
	Typical composition of a battery off-gassing event may include: ▪ High concentrations (>10%) of Hydrogen, Carbon Monoxide, and Carbon Dioxide ▪ Lower concentration (<10%) of Methane, Ethane, or other flammable hydrocarbons

6.7 Additional Hazards and Considerations

For additional hazards associated with leaked coolant; leaked refrigerant; leaked electrolyte; emergency considerations during storage, operation, or transportation; first aid measures; or disposal procedures, please see product-level SolBank Safety Manual.

7 EMERGENCY RESPONSE CONSIDERATIONS

7.1 Emergency Contacts

A list of emergency contacts associated with this installation is provided on page 3.

7.2 Personal Protective Equipment (PPE)

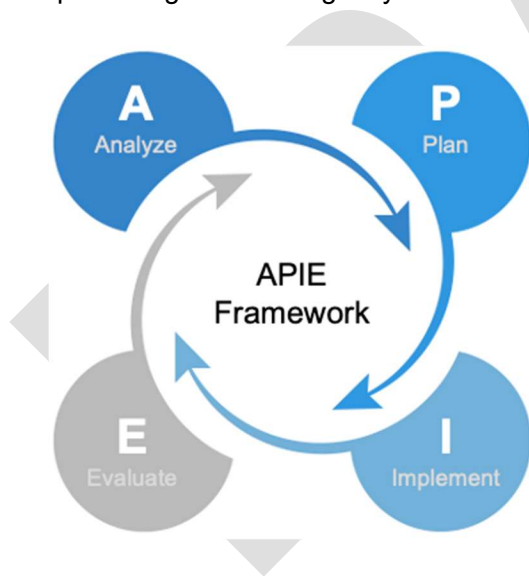
Full firefighter protective gear including SCBA shall be worn during response to any fire and / or explosion event or if there is any indication a fire may be present or likely to be present at any time during the event.

If there is no risk of fire or explosion present, arc-rated (AR) protective clothing to protect against arc flash and electrical shock shall be worn. Jewelry such as necklaces shall be removed to avoid contact with any electrical hazard.

Proper PPE shall include use of a Self-Contained Breathing Apparatus (SCBA).

7.3 APIE (Analyze, Plan, Implement, and Evaluate) Framework

APIE is a framework commonly used for emergency incidents to prepare and develop appropriate response protocol(s). The four elements of the framework are Analyze, Plan, Implement, and Evaluate. An example APIE framework with simplified sample details pertaining to an emergency incident is provided below:



Analyze: For first responder awareness, provide signs and monitoring signals that indicate incident escalation may take place (e.g., fire or explosion).

Plan: Delineate the danger zone to mitigate risks to first responders and bystanders (pedestrians, vehicular traffic, etc.).

Implement: Enforce evacuations; street closures; reduced pedestrian and first responder exposure; and other impact areas that have a life safety concern, as applicable.

Evaluate: Provide continuous incident monitoring and feedback and adjust accordingly to ensure ongoing safety of any bystander or responder in the impacted area.

7.4 General Size-Up

Initiation of emergency response shall be activated per current protocol. If there is any threat or potential threat to life or safety, 911 shall be called immediately to summon the aid of public safety responders. An initial scene assessment shall be conducted from all sides (360-degree scene size-up) if possible, and a clear, concise assessment shall be given to incoming

responders. Hazards and facility safety concerns such as high voltage areas or other electrical concerns shall be communicated to all responders.

The scene assessment shall include the following in plain language (no codes or terms):

- Incident location
- What has happened
- What is occurring
- Any injuries or unaccounted for individuals
- Additional needs or other resources that may be necessary

The Incident Command System (ICS) shall be established immediately and shall include designation of roles. The Incident Command Post (ICP) shall be located at the Fire Department Staging Area at the east entrance of the site. If Public Safety is summoned to the incident, the ICS shall incorporate a Unified Command (UC).

On-site staff (if applicable) shall immediately proceed to a designated muster point, which will be at the ICP location unless designated otherwise by the Incident Commander. Incident Command shall designate an individual to oversee personnel accountability. Accountability shall be reported as soon as possible. If available, another individual shall control any traffic and guide first responders to the scene.

At the same time as these activities are occurring, the designated SME shall immediately contact the Remote Operations Center (ROC) to obtain available data from the BMS and communicate this to the Incident Commander or other appropriate individual.

WARNING: Risk of Explosion / Deflagration	
	An explosion / deflagration / overpressure event is a critical hazard, and any emergency on site should always be addressed with full awareness of potential factors which may lead to such an event. <u>Any failure or alarm condition should result in the assumption of an explosion risk.</u>
WARNING: Toxic Gases	
	Large quantities of toxic smoke and gas may be emitted from the ESS during battery off-gassing or fire situations. <u>Proper PPE including SCBA should be worn by first responders.</u>

7.5 Determine Fire Protection Approach

The decision to provide thermal cooling via hoselines should be made in coordination with the System Owner / Operator and any other required SMEs.

Caution should be exercised if water is applied directly to the exterior of an affected ESS enclosure, as this will not stop a thermal runaway event and may potentially delay eventual combustion of the entire ESS product. Defensive firefighting tactics are generally recommended, with water being applied to nearby exposures for cooling, as necessary. Any hoseline operations should be limited to hose and master stream application from outside of the construction perimeter, as far back as hose stream ranges allow.

A fog pattern from a handline or monitor nozzle may potentially be utilized to control smoke and gases released from the affected enclosure and prevent them from migrating to unwanted areas.

In all instances, power shutdown and isolation involving any high voltage feeder lines must be confirmed before any defensive measures are taken involving application of water to the site.

WARNING: Risk of Re-ignition	
	Do <u>NOT</u> assume the fire is out as the fire event unfolds. A lithium-ion battery fire, which has seemingly been extinguished, may flare up again if all cells within the enclosure have not been completely consumed. The risk of battery re-ignition can remain present for hours or even days after the smoke / flame is initially detected.

7.6 Incident Monitoring and Evaluation

Continuous incident monitoring and feedback should be provided as the situation evolves. Consultation with the System Owner / Operator, and any other required SMEs, should be ongoing to guide incident response and determine appropriate next steps.

If available, real-time BMS data from the Remote Operations Center (ROC) should be utilized (e.g., temperature, voltage, or other critical measurements) to monitor the spread of failure and assess the health of adjacent ESS units. This data will help guide response procedures as the event unfolds.

8 INCIDENT SCENARIOS

8.1 Explosion Incident

Lithium-ion batteries release flammable off-gases during thermal runaway which, if allowed to accumulate within the enclosure, may create an explosive atmosphere, posing serious risk to first responders and nearby exposures. Furthermore, it may be difficult to discern conditions within the enclosure if smoke and gas are not visible outside of the unit.

In the case of a fire or thermal runaway event, an explosive or deflagration event may occur, potentially subjecting personnel to overpressure and projectile hazards. An initial exclusion zone should be established to guard against any blast overpressure, based on the discretion of the Incident Commander. Fire Department staging and operations should not be in direct alignment with the ESS units and should be established at angles relative to the sides of the enclosures, if possible. If available, shielding via the built environment should be utilized to protect against high temperatures, overpressure events, or projectile hazards.

A safe stand-off distance shall be maintained between individuals and the ESS enclosure(s) exhibiting fire conditions. Staging of personnel and equipment shall be located at angles relative to the ESS enclosure(s) to stay out of the potential blast radius of any enclosure doors or other possible projectiles.

WARNING: Risk of Explosion / Deflagration	
	An explosion / deflagration / overpressure event is a critical hazard, and any emergency on site should always be addressed with full awareness of potential factors which may lead to such an event. <u>Any failure or alarm condition should result in the assumption of an explosion risk.</u>

8.2 Fire Incident

Upon activation of smoke and/or heat detectors in an affected SolBank enclosure – indicating a possible fire incident – a signal will be sent to the Fire Command Center and audible and/or visual notification devices on the exterior of the enclosure will alarm. Smoke and flames may be visible from the outside of the ESS enclosure. Fire growth may be slow, fast, or ultra-fast (e.g., during a deflagration event) in nature.

A safe stand-off distance shall be maintained between individuals and the ESS enclosure(s) exhibiting fire conditions. Staging of personnel and equipment shall be located at angles relative to the ESS enclosure(s) to stay out of the potential blast radius of any enclosure doors or other possible projectiles. Attempt to extinguish the fire only if imminent threat to life safety exists.

If there is no immediate threat to life safety:

1. Allow the ESS to burn in a controlled fashion until all fuel sources inside are depleted.

2. A defensive approach should be considered, utilizing water to cool and protect adjacent exposures and to mitigate the spread of fire to areas outside of the fenced installation.
3. Manage the fire incident by utilizing the reach of the hose stream to protect exposures and control the off-gassing and smoke from the enclosure.
4. Remember that, even after the ESS is isolated from the electric grid, there may still be considerable stored energy in the batteries that poses a potential electric shock hazard to anyone in the nearby vicinity.

Additionally, chemicals released during a fire or explosion event will be in a gaseous form and primarily pose an inhalation hazard. A fog pattern from a handline or monitor nozzle may provide an effective means of controlling any off-gases outside of the battery enclosure from migrating to unwanted areas such as public muster points, emergency responders, building intakes, etc.

Hose streams may be also applied to adjacent exposures for cooling purposes, including during high-wind conditions. BMS data for the adjacent system(s) – available via the Remote Operations Center (ROC) – should be closely monitored for any indications of heat impact or water damage to any adjacent ESS units and relayed to the appropriate individual within the Incident Command System.

Following partial or complete consumption of the system by fire, batteries may continue to emit flammable and toxic gases for an extended period of time. Continuous monitoring of gas levels in and around the incident location is recommended. Full firefighter PPE and SCBA shall be utilized until gas levels are confirmed to be at a safe level. A fire watch shall be provided to ensure the continued safety of the site after the situation appears stable.

WARNING: Risk of Re-ignition	
	Do NOT assume the fire is out as the fire event unfolds. A lithium-ion battery fire, which has seemingly been extinguished, may flare up again if all cells within the enclosure have not been completely consumed. The risk of battery re-ignition can remain present for hours or even days after the smoke / flame is initially detected.

8.3 Thermal Runaway or Off-Gassing Incident

A thermal runaway incident, as described in [Section 6.1](#), is the characteristic failure mode of lithium-ion batteries. A thermal runaway event may begin suddenly, and the nature of the situation may evolve rapidly depending on several different factors. Combustion of flammable gases may result in fire or explosion, and considerations in [Section 8.1](#) and [Section 8.2](#) should be implemented based on the nature of the event as it unfolds.

A thermal runaway event may result in large quantities of smoke and gas being released, which may or may not be visible outside of the ESS enclosure itself. Therefore, it is critical that any failure or alarm condition results in the assumption of an explosion or fire risk.

In the event of a thermal runaway or suspected off-gassing event, the following actions should be taken:

1. Evacuate the area to a safe location at a sufficient distance from the troubled enclosure.
2. If the alarm system has not already signaled the Fire Department, immediately call 911.
3. Call the Subject Matter Expert (SME) designated for the site.
4. Call the Remote Operations Center listed on page 3.
5. Establish a safety perimeter around all sides of the ESS and remain outside the fenced area. Based on conditions, the safety perimeter may extend beyond the boundary of the fenced area. Stay upwind of any smoke or off-gassing. Do not allow personnel other than firefighters in proper PPE to enter the safety perimeter.
6. As the incident evolves, a fire or explosion event may occur. Procedures outlined in [Section 8.1](#) and [Section 8.2](#) should be followed based on the situation as it progresses.

WARNING: Risk of Explosion / Deflagration



An explosion / deflagration / overpressure event is a critical hazard, and any emergency on site should always be addressed with full awareness of potential factors which may lead to such an event.

Any failure or alarm condition should result in the assumption of an explosion risk.

WARNING: Risk of Re-ignition



Do **NOT** assume the fire is out as the fire event unfolds. A lithium-ion battery fire, which has seemingly been extinguished, may flare up again if all cells within the enclosure have not been completely consumed. The risk of battery re-ignition can remain present for hours or even days after the smoke / flame is initially detected.

WARNING: Toxic Gases



Large quantities of toxic smoke and gas may be emitted from the ESS during battery off-gassing or fire situations.

Proper PPE including SCBA should be worn by first responders.

NOTICE



Indicators which may provide insight into what is happening or about to happen during an incident may include:

- Smoke or flames
- Changes in smoke color
- Changes in velocity or volume of smoke production
- Sounds – popping and / or hissing
- Smell – sweet odor

8.4 Alarm Incident

In the event of an alarm activation, the following actions should be taken:

1. Evacuate the area to a safe location at a sufficient distance from the troubled enclosure.
2. If the alarm system has not already signaled the Fire Department, immediately call 911.
3. Call the Subject Matter Expert (SME) designated for the site.
4. Call the Remote Operations Center listed on page 3.
5. Establish a safety perimeter around all sides of the ESS and remain outside the fenced area. Based on conditions, the safety perimeter may extend beyond the boundary of the fenced area. Stay upwind of any smoke or off-gassing. Do not allow personnel other than firefighters in proper PPE to enter the safety perimeter.

Note: Depending on prevailing weather conditions, the safety perimeter may have to be adjusted/shifted. The Incident Commander may determine a secondary safety perimeter depending on the severity of the event and wind impact.

8.5 External Fire / Thermal Exposure Incident

Any type of external heat source or fire impingement (i.e., not stemming from the battery system itself) should be treated as an ESS emergency. The Incident Commander should be advised to obtain information on ESS state of health from the BMS data (e.g., increasing temperature in exposed ESS units) – available from the [Remote Operations Center] – to evaluate severity of the incident. All precautions previously noted for fire and explosion incidents should be followed.

8.6 Emergency Response During Construction, Commissioning, and Maintenance

The SolBank system is shipped with battery modules installed and partially charged. This is not uncommon throughout industry but poses some challenges to emergency response which may not exist during normal operations. Once the batteries arrive, there will be some period of time until the fire protection system is commissioned.

During this period, fire service personnel should expect to interface with an SME, but no data regarding the conditions inside the enclosures may be available. As such, fire service personnel should take extreme caution when approaching any system which may be experiencing adverse conditions during this phase. Further, information regarding conditions in adjacent containers (relevant in the event of fire) may not be available. Fire service personnel should lean on their own experience and stakeholder expertise to determine risks to adjacent containers and assume direct fire impingement poses an enclosure-to-enclosure propagation risk.

Between delivery and commissioning of the fire protection system, the explosion prevention system may not be active. In cases where an adverse condition exists inside the system, it should be assumed an explosive condition exists until proven otherwise.

8.7 External Impact Incident

If an enclosure is severely impacted, causing crushing or puncturing of the outer shell of the enclosure, treat this as an emergency – notify 911 and any other required parties.

9 POST-INCIDENT / HANDOFF PROCEDURES

9.1 Handoff Procedures

When an energy storage site is deemed safe, upon determination by the Incident Commander (IC), the Subject Matter Expert (SME) shall ensure that the site is safeguarded until the damaged system is removed, repaired, or replaced based on the approved Decommissioning Plan filed with this installation.

9.2 Activation of Decommissioning Plan

Decommissioning of the system shall take place in accordance with the approved Decommissioning Plan filed with this installation. Deactivation, de-energizing, dismantling, and removal of the system shall be conducted by trained and knowledgeable persons in accordance with manufacturer's specifications.

APPENDICES

APPENDIX A – Additional Site Photos

Figure A1 – Additional Site Photos



APPENDIX B – Signage / Placarding / IO Matrix

Figure B1 – Facility Signage / Placarding



Figure B2 - I/O Matrix



APPENDIX C – Annual ERP Review Log

The following table provides a log of reviews to be conducted on an annual basis for this Emergency Response Plan (ERP).

Date Conducted	System Owner Sign-Off	SME Sign-Off	Notes / Comments