Version 1.3, 05/18/2023

Pacific Gas and Electric Company (PG&E)

PRE-FIRE PLAN

Elkhorn Energy Storage (at Moss Landing Substation)

7251 Hwy 1, Moss Landing, CA 95039
Access via 36.801556, -121.772371; 383 Dolan Rd (marked as MLPP Gate 1 or 2)

There are two physical copies stored on site (Front gate & BESS Incident Command Building). The document will be reviewed annually to incorporate any necessary changes.

This plan has been developed to assist the local emergency responders with important safety and emergency response information concerning the Elkhorn Energy Storage facility. This document is to be used in conjunction with the Substation Pre-Fire Plan. This document and supporting drawings should be consulted prior to any fire service personnel entering the site.

Approved by:

[redacted]	[redacted]
PG Fossil & Renewables, Director	Fire Controls Program Manager, Principal

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2 Site Map

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3 Reference Sheet

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Warnings/Cautions

WARNING: CONSIDER all equipment ENERGIZED until CONFIRMED – DE-ENERGIZED and GROUNDED by QUALIFIED PG&E personnel. Adjacent electrical equipment not involved in a fire may still be energized during an event.

WARNING: Batteries cannot be entirely de-energized and may contain charge after site is de-energized or equipment is damaged.

Firefighter Personal Protective Equipment (PPE): If fire/smoke/gas or unknown conditions are present, firefighters should wear Self-Contained Breathing Apparatus (SCBA) and fire protective turnout gear.

WARNING: Do not come into contact with venting gas or smoke without appropriate PPE. Venting electrolyte can be extremely hot (>600°C).

WARNING: Do not open any doors, cut into, or touch the damaged unit unless PG&E personnel advise that it is safe to do so.

CAUTION: A battery fire may continue for several hours and may result in multiple re-ignition events. It may take 24 hours or longer for the battery pack to cool. Water on burning unit will only delay full burn and not suppress it.

Hazard Identification

Megapack: Mechanical Damage – See section 6.1, page 8

Megapack: Fire – See sections 6.2 & 6.7, pages 8 & 9

Lithium-Ion batteries are housed inside the Megapack unit.

Megapack: Venting Electrolyte – See section 6.7, page 9

Appears as white smoke from top of megapack. Vented gases may irritate the eyes, skin, and throat. Cell vent gases are typically hot; upon exit from a cell, vent gas temperatures can exceed 600°C (1,110°F). Contact with hot gases can cause thermal burns. Vented electrolyte is flammable and may ignite on contact with a competent ignition source such as an open flame, spark, or a sufficiently heated surface.

Megapack: Leaking Electrolyte – See section 6.6, page 9

Leaked electrolyte is colorless and characterized by a sweet odor. Leaked electrolyte solution is flammable and corrosive / irritating to the eyes and skin. If an odor is obvious, evacuate or clear the surrounding area.

Any released electrolyte liquid is likely to evaporate rapidly, leaving a white salt residue.

If a liquid is observed that is suspected to be electrolyte, ventilate the area and avoid contact with the liquid until a positive identification can be made.

Evaporated electrolyte gas is flammable and will contain alkyl-carbonate compounds.

Megapack: Leaking Coolant – See section 6.4, page 9

Fluid is blue in color and does not emit a strong odor. No immediate contact hazard. See Safety Data Sheet (SDS) for additional guidance.

Transformer: Mechanical Damage – See section 5.4, page 8

Transformer: Fire – See section 5.2 or 5.3, page 8

Fire Fighting Guidance

Megapack Fire

Contact Tesla Energy Technical Support: North America Hotline (24/7) 1-650-681-6060

Employ a defensive firefighting strategy only. No water on burning Megapack. Allow the affected unit to consume itself as designed. Applying water to the burning unit will only slow its eventual combustion.

Firefighters should wear SCBA and structural firefighting turnouts when in close proximity to burning Megapack(s), or within plume travel path.

At the discretion of the Incident Commander (IC), apply water to neighboring exposures:

Primary focus for water application: Radiant heat or fire impacting nearby transformers, buildings, and/or foliage.

Note: For adjacent Megapacks, water may not provide significant cooling or protective benefit. (See Sec 6.2 for additional guidance)

Use a wide-fog stream, at lowest volume possible, to achieve desired cooling.

Transformer Fire

No water unless Incident Commander (IC) deems desired.

Switchgear Enclosure Fire

No water **inside** enclosures at any time. Exterior cooling should use fog pattern only, if advised by IC.

Sealed Lead Acid battery room in Switchgear Building 1

Switchgear enclosures have [redacted] fire suppression in all rooms.

Do not open any doors to enclosures without full PPE and SCBA gear.

Access

[redacted]

Equipment on Site

[redacted]

Pond 4 – 90k gallons, [redacted]

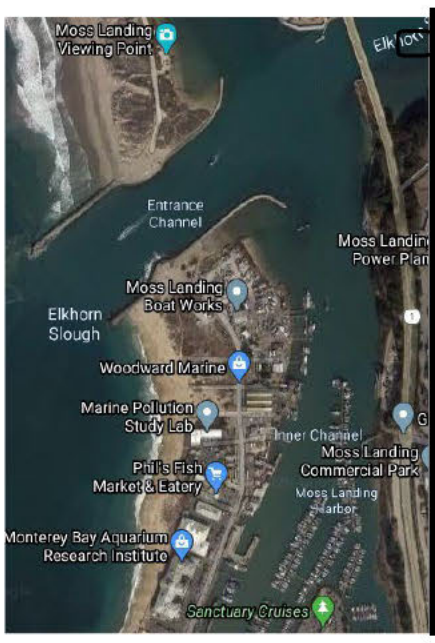
Pond 3 – 84k gallons, [redacted]

BATTERY ENERGY STORAGE SYSTEMS (BESS) EMERGENCIES

QUICK REFERENCE GUIDE – Page 1 of 2

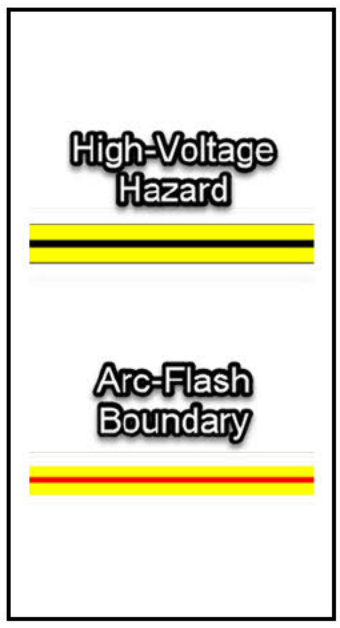
Upon Arrival

1. **IDENTIFY** PG&E substation qualified escort to enter the substation.
2. **LOCATE** the PG&E Incident Commander, hazards, location of scene, this Pre-Fire Plan, and SDS documentation.
3. **PROCEED** with the escort to BESS Incident Command building [redacted] inside the substation.
4. **COORDINATE** with PG&E Incident Commander to determine location of involved equipment and action plan.
5. **WATCHOUT** for high voltage & other hazards that may develop. Remain on roadways wherever possible.



[redacted]

IDENTIFY, LOCATE, PROCEED & COORDINATE



WATCH OUT

Warning and Cautions

CONSIDER all equipment ENERGIZED until CONFIRMED – DE-ENERGIZED and GROUNDED by QUALIFIED PG&E personnel. Adjacent electrical equipment not involved in a fire may still be energized during an event.

- In all cases, determine de-energization requirements and status with PG&E Incident Commander (IC). Coordinate response activities.
- Evacuate the area of all non-emergency personnel.
- Be prepared to assist with any injuries or personnel who remain at assembly point, aid in evacuation if necessary.
- If not already done, contact Tesla Energy Technical Support for assistance:
  - North America Hotline [redacted]
- Safety Data Sheets (SDS) can provide important information regarding battery chemistry. Obtain Tesla Megapack SDS from IC Building.
- Some exposed electrical components, wires, and batteries present potential shock hazards even if the equipment is de-energized.
- Do not open any doors, cut into, or touch the damaged equipment unless PG&E personnel advise that it is safe to do so.
- A battery fire may continue for several hours and may result in multiple re-ignition events. It may take 24 hours or longer for the battery pack to cool. Water on burning unit will only delay full burn and not suppress it. After initial burn, coordinate with PG&E Incident Commander on determining fire watch strategy.

  At the IC Building:

  - Confirm the location and extent of the fire [redacted]
  - Monitor the battery module temperature of the Megapacks in close proximity to the burning Megapack:
    - Log the temperature. Recheck every 10 minutes. Consult Tesla if temperature increases more than 5 degrees Celsius (9 degrees F).
  - Establish a water source.
  - Collect and deploy un-manned nozzle monitors as needed, per direction of the IC.
  - Fog pattern to be used defensively to cool exposures, not directly on burning unit.
  - Allow the affected unit(s) to consume itself over a period of hours.
  - At the discretion of the IC, apply water to neighboring exposures:
    - **Primary focus for water application**: Radiant heat or fire impacting nearby transformers, buildings, and/or foliage.
    - **Note**: for adjacent Megapacks, water may not provide significant cooling or protective benefit. (**See Section 6.2 for additional guidance**).
  - Continue to monitor visual and thermal data until fire subsides.
  - After fire subsides, monitor for visible flames until PG&E determines fire watch strategy.

  WARNING: There may be periods of up to [redacted] at a time during which the thermal runaway propagates from battery modules to battery modules within the single Megapack. During such time, the battery may not generate visible signs of thermal event although the event can still be active and the battery can flare up.

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BATTERY ENERGY STORAGE SYSTEMS (BESS) EMERGENCIES

QUICK REFERENCE GUIDE – Page 2 of 2

Fires			Spills
Battery/Transformer	**Switchgear Enclosures**	**Other**	**Electrolyte / Refrigerant Coolant / Oil**
• Confirm appropriate de-energization • Collect and deploy un-manned nozzle monitors as needed. • Fog pattern may be used defensively to cool exposures, not directly on burning unit. • After fire subsides, monitor for re-ignition until PG&E determines fire watch strategy.	• **Ensure no personnel still inside enclosure** • Confirm appropriate de-energization. • No water on or in switchgear enclosures. Allow to burn out. • Switchgear enclosures are protected by [redacted] fire suppression system.	• Vehicle fires can be handled normally while keeping in mind neighboring equipment (Check for downed wires) • Review nearby equipment with PG&E Incident Commander and determine de-energization required • Outbuildings should be reviewed with [redacted] IC for hazards.	• Identify spill. • Spill may not be visible if batteries are mounted inside a cabinet • Check Safety Data Sheet (SDS) for specific hazards and mitigation information • Wearing PPE with SCBA, contain the spill (ensure compatibility with spilled product) • Neutralize & absorb corrosive liquids (only by qualified personnel) • Decontaminate PPE • Turn over incident to a qualified, responsible party for additional monitoring

5 General Substation Hazards

5.1 Cable Insulation Burn Characteristics

Cable insulation should be treated as a deep-seated fire. Water should only be applied when the circuit has been certified de-energized and grounded by PG&E.

Combustible cable insulation will produce dense, black smoke. **WEAR** SCBA.

5.1.1 Water Suppression Electrical Hazard

The recommended minimum distances for the use of water fog/spray under normal circumstances should be maintained at 33 ft. (10 m.). Water must never be discharged in the form of a straight stream. Fog or water spray at minimum of 30 º setting with a minimum pressure of 100 psi at the nozzle

Note: Absolute limits of approach in relation to fire-fighting operations and the use fog spray on energized equipment under direction of the onsite qualified PG&E personnel are:

Line-Line Voltage			*Minimum Distance*
0	-	*750 Volts*	*5 Feet (1.5 meters)*
751	-	*15000 Volts*	*10 Feet (3.0 meters)*
15000	-	*230000 Volts*	*15 Feet (4.6 meters)*
230000	-	*500000 Volts*	*25 Feet (8 meters)*

5.1.2 DC POWER – Station Batteries and Protective Relaying

The station contains [redacted] circuits. Although specific [redacted] equipment and circuits may be de-energized, [redacted] power can still be present and represents a significant electrical shock hazard. Care should be used when working with any equipment within the station. All components must be considered ENERGIZED unless it has been DE-ENERGIZED AND GROUNDED.

5.1.3 Explosion Potential

Megapacks are designed to burn without risk of explosion and to contain and direct smoke/flame through vents at the top of each bay so long as the doors remain closed and the exterior shell is not compromised. As result, the explosion potential is considered very low.

[redacted]

5.1.4 Oil Hazard

[redacted]

5.1.4.1 Envirotemp FR3 Fluid

FR3 Fluid is a bio-based natural ester dielectric coolant as an alternative to mineral oil. [redacted]

5.1.4.2 Mineral Oil

Combustible insulating oil is used in some transformers, circuit breakers, and capacitors. [redacted]

5.2 FR3 Fluid Filled Equipment Fire

[redacted]

5.2.1 Medium Voltage Transformer Fire

[redacted]

5.2.2 Station Service Transformer Fire

[redacted]

5.3 Mineral Oil Filled Equipment Fire

[redacted]

5.3.1 Power Transformer Fire

[redacted]

5.3.2 Instrument Transformer Fire

[redacted]

5.4 Transformer Mechanical Damage

[redacted]

5.5 Switchgear Enclosures/Buildings

[redacted]

6 Battery Related Hazards

6.1 Mechanical Damage

[redacted]

6.2 Megapack Fire & Smoke/Gas Hazards

Based on guidance contained in the "Tesla Battery Emergency Response Guide, [redacted] Smoke or suspicious odor emanating from a Tesla Energy product can be an indication of an abnormal and hazardous condition. Battery thermal runaway fires are preceded by a period of smoke.

Unless advised by Tesla, no water is necessary to contain a Megapack fire. Tesla's recommendation is to fight a Megapack fire defensively. The fire crew should establish a water supply and position hose lines as necessary while maintaining a safe distance and allowing the battery to burn itself out. Applying water directly on the burning unit will only delay the burn and not suppress it. A battery fire may continue for several hours and may result in multiple instances of visible fire. It may take 24 hours or longer for the battery pack to cool.

A Megapack that is venting gases means that internal safety controls have failed to stop a thermal event and the battery is going into thermal runaway. [redacted]

A Megapack that is burning is designed to fully consume itself without causing adjacent Megapacks to increase in temperature from radiant heat exposure.

- Previous incidents and testing have demonstrated that adjacent Megapacks have not increased in temperature due to radiant heat exposure.
- Megapack battery cells and modules have significant thermal mass and therefore are resistant to radiant heat causing increases in temperature. Water applied to the exterior will have limited cooling effect for the batteries on the interior of the enclosure due to this thermal mass and the construction of the enclosure.
- Even if batteries should begin to increase in temperature in adjacent MPs, exterior water application is most likely not going to prevent a thermal runaway incident.

During open flaming of a Megapack, continue to monitor the internal temperatures of adjacent exposed Megapacks [redacted]

At the discretion of the Incident Commander, fire crews should utilize a fog pattern to protect neighboring exposures or to control the path of smoke.

> **Primary focus for water application:** Radiant heat or fire impacting nearby transformers, buildings, and/or foliage.
>
> Note: For adjacent Megapacks, water may not provide significant cooling or protective benefit. (See Sec 6.2 for additional guidance)

[redacted] a defensive spray while maintain a safe distance from a fire.

WARNING: AVOID DIRECT CONTACT WITH SMOKE. FULL SCBA GEAR REQUIRED FOR WORK IN PROXIMITY TO BURNING UNITS AND SMOKE.

Based on UL 9540A Full Scale Fire Testing, flames are expected to eventually come from all vents and may emanate from the front door frames. Depending on wind direction/strength, flames may extend 8-10 feet in front of the megapack.

[redacted]

Predominant wind direction for the Elkhorn site location is from the West however a weather station is present on site and can provide real time wind and other meteorological data. The data will be available through the Emergency Battery Information Display at the Incident Command location.

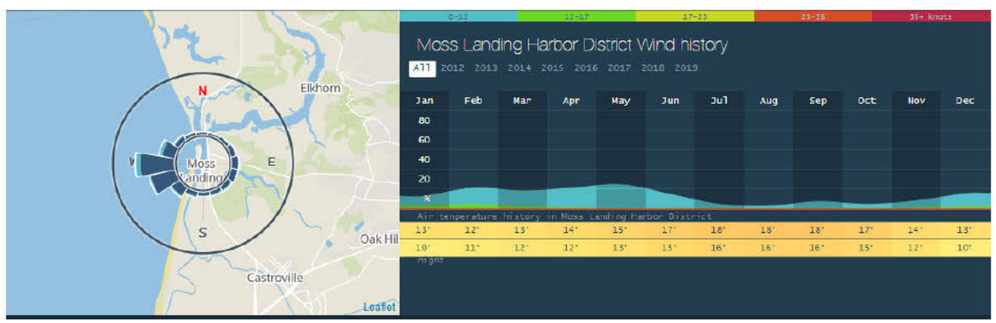


Figure 2: Historical Wind Direction & Speed (Source: https://windy.app/forecast2/spot/1874455/Moss+Landing+Harbor+District/statistics)

6.3 Megapack Shock Hazards

[redacted]

6.4 Leaked Coolant

[redacted]

6.5 Leaked Electrolyte

[redacted]

6.6 Vented Electrolyte

[redacted]

7 Detection, Suppression, Equipment, Remote Monitoring Systems

7.1 Detection

Each Megapack provides temperature data to the remote monitoring centers where alarms are raised for any high temperature events.

[redacted]

7.2 Suppression

No automatic suppression systems are present in the battery field.

All rooms of the Switchgear Enclosures are equipped with [redacted] suppression.

7.3 Hydrants and Firefighting Equipment

[redacted]

7.4 Remote Monitoring Centers

PG&E Fresno Operation Center (FOC) can provide additional situational awareness about data that may be available from the site. FOC will communicate with the PG&E Incident Commander any information that is necessary for response.

7.5 Emergency Battery Information Display

[redacted] This display provides battery site data including temperature, energization status, site camera, and other data that can support response activities.

7.6 De-energization Scheme Summary

[redacted]

However, batteries still will contain whatever charge they had when disconnected.

[redacted]

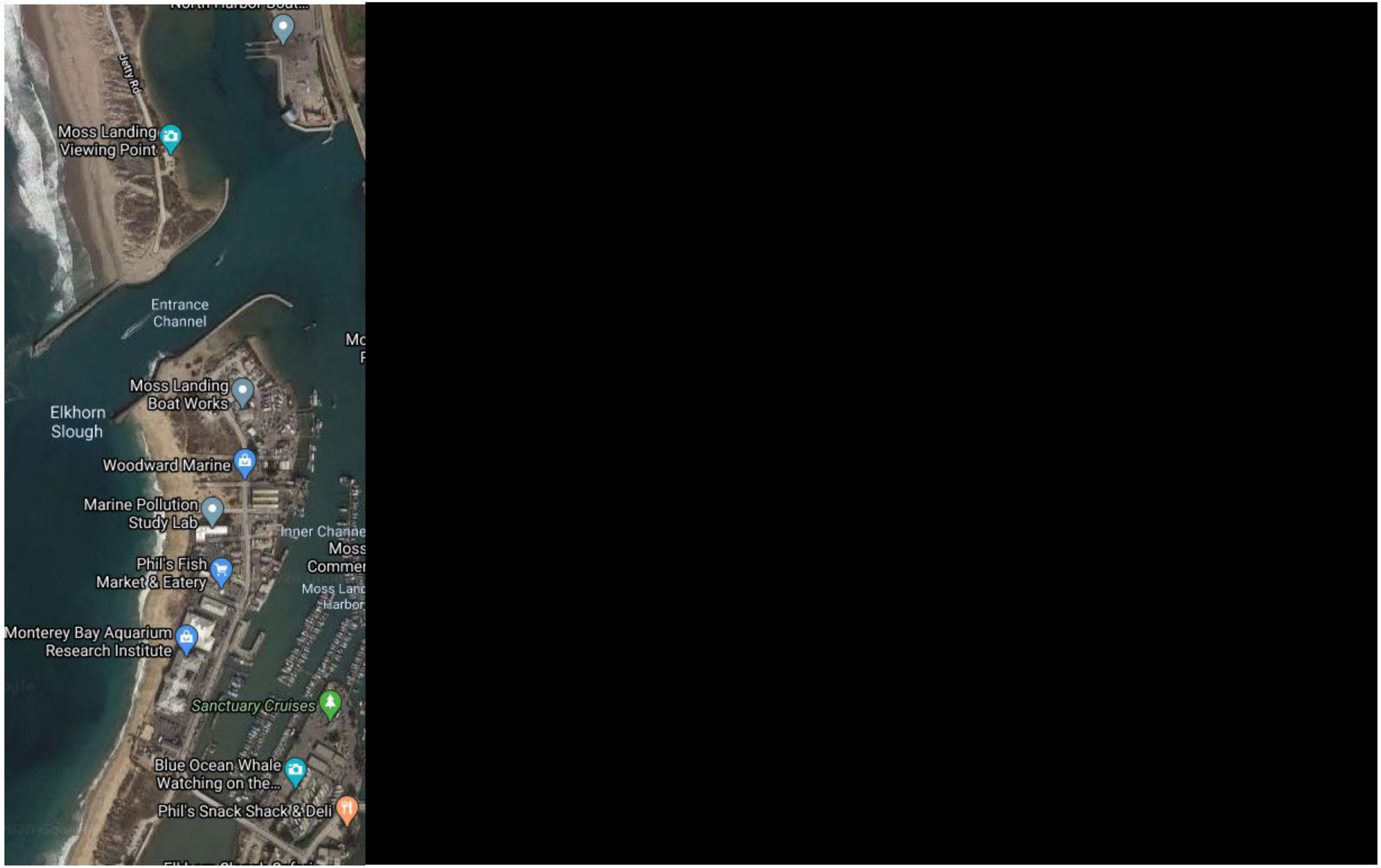
[redacted]

7.7 Battery Emergency Stop Button

[redacted]

8 Appendix 1: Site Maps, Drawings, & Figures

8.1 Satellite



Map 2: Google Earth Aerial Overview

8.2 [redacted] Layout

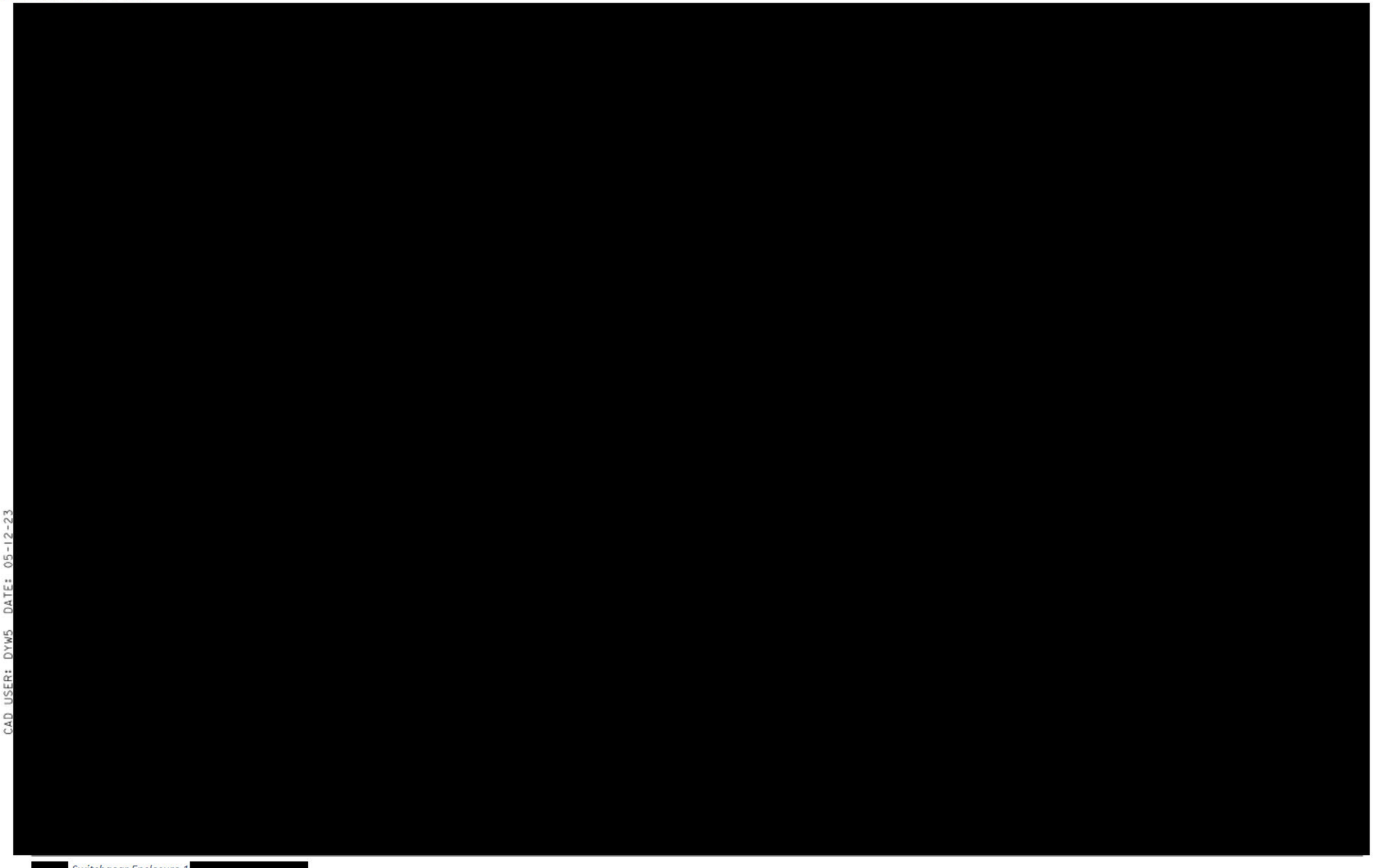
[redacted]

8.3 Example Flame Detector Coverage Drawing

8.4 Single Line Diagrams

[redacted]

8.5 Enclosure Floor Plans



[redacted] *Switchgear Enclosure 1* [redacted]

[redacted]

[redacted] *Switchgear Enclosure 2* [redacted]

Switchgear Enclosure 3

[redacted]

[redacted] *Incident Command Center* [redacted]

8.6 Site Drainage

Site Drainage

9 Appendix 2: Building & Equipment Photos

Megapack aerial view looking west

Example Megapack lane looking west

Megapack front view

Megapack side view

10 Appendix 3: Material SDS's

See attached: Coolant SDS, Envirotemp FR3 Fluid SDS, Mineral Oil SDS, HDPE SDS

11 Revision Notes

Version	What Changed?	Date
Initial Draft	V1.0 - New Document	6/16/2021
V1.1	Added Equipment Photos	6/28/2021
V1.2	Removed Refrigerant from section 3 & 6.5 & SDS list	7/13/2021
V1.3	1. Updated PFP Approvals to remove Substation FM and add Renewables Leadership 2. Reformatted Page 4 Reference Sheet, slightly modifying defensive firefighting application of water to protect unaffected Megapacks, based on Tesla ER guidance. 3. Expanded Section 4 Fire Fighter Quick Reference Guide BESS Emergencies from one page to two and included guidance for IC Building Actions. 4. Revised Section 6 – Battery Emergencies, Sections 6.2 through 6.6, to reflect Tesla ERG Reference dated November 11, 2022 vs. March 2020. All Section 6 technical content verified by Tesla Fire Protection Engineer (FPE) [redacted]	03/23/2023