

DOCKETED

Docket Number:	88-AFC-01C
Project Title:	Compliance - Application for Certification for LUZ Solar Electric Generating Systems Cogeneration Unit VIII
TN #:	231314
Document Title:	Data Request Responses Set 2 for SEGS VIII and IX (88-AFC-01C AND 89-AFC-01C) PTM to add BESS
Description:	Data Request Responses Set 2 for SEGS VIII and IX (88-AFC-01C and 89-AFC-01C) PTM to add BESS
Filer:	Amanda Johnson
Organization:	LSA
Submitter Role:	Applicant Consultant
Submission Date:	12/24/2019 9:41:34 AM
Docketed Date:	12/24/2019

**DATA REQUEST RESPONSES
SET 2**

**SOLAR ENERGY GENERATING SYSTEMS (SEGS) VIII AND IX
(88-AFC-01C AND 89-AFC-01C)**

**POST-CERTIFICATION PETITION FOR
BATTERY ENERGY STORAGE SYSTEM**

LSA

December 2019

The following are the responses to the Data Requests, Set 2, received from the California Energy Commission (CEC) in a letter dated November 27, 2019 for the Solar Energy Generating Systems (SEGS) VIII and IX Petition for Post Certification Change to add Battery Energy Storage System (BESS). Attachment A of this document contains the CEC Data Request letter.

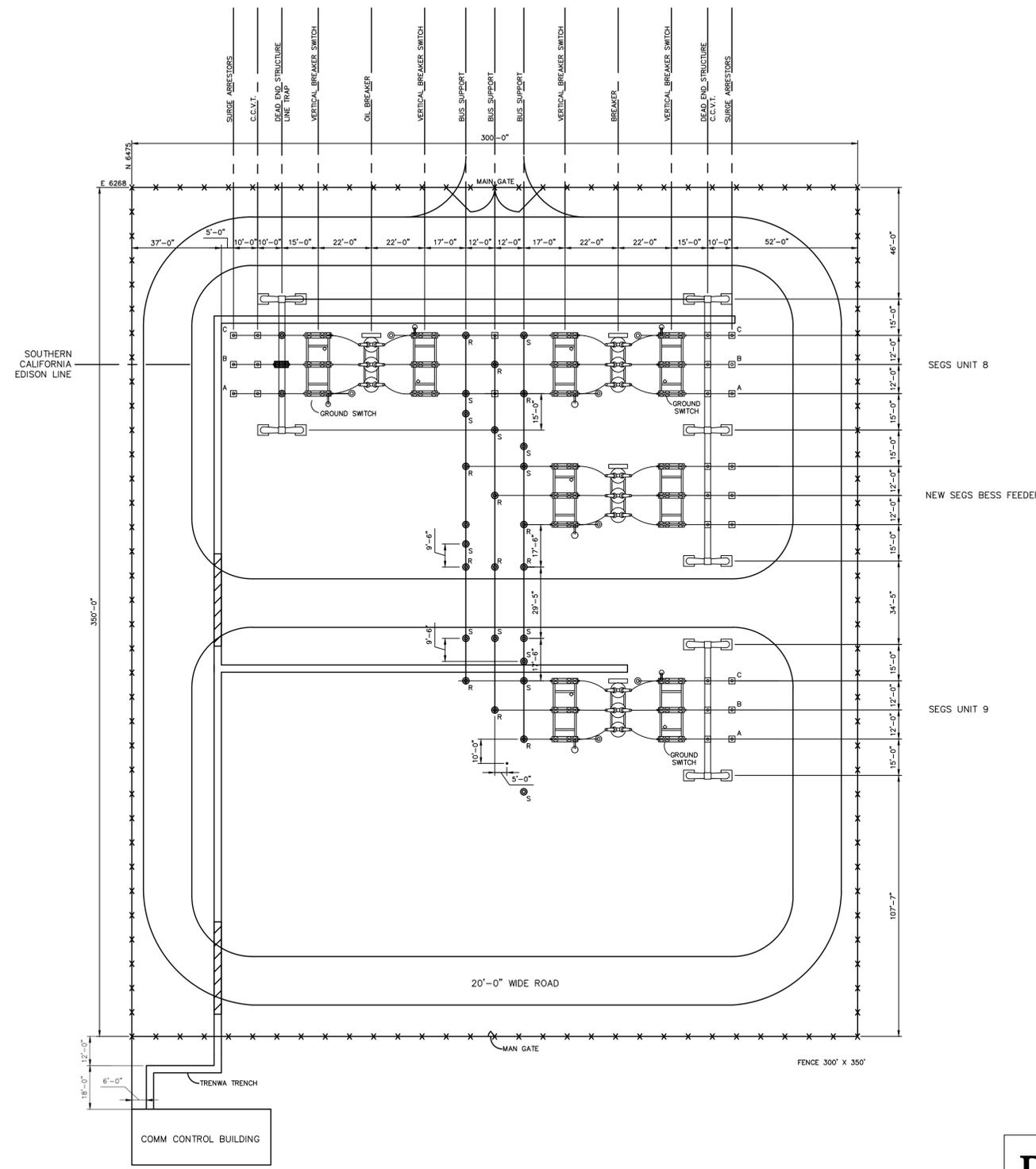
TRANSMISSION SYSTEM ENGINEERING

Data Request B1: *Provide a detailed description of any changes in design, construction, and operation of any electric transmission facilities associated with the addition of energy storage and to the existing SEGS VIII and IX facilities. Providing descriptions and drawing of both the existing and proposed facilities would be the most effective way to communicate the proposed changes.*

RESPONSE

The BESS system will make use of the existing SEGS VIII and IX switchyard, common 230kV project substation bus, and 230kV generation tie-line all of which currently interconnects SEGS VIII and IX to the 230kV Kramer substation. With the addition of the BESS, the existing on-site switchyard will be modified to add a new breaker, new switches, and new metering.

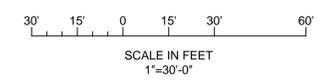
Please refer to the Figure B1, SEGS VIII and IX 230 kV Common Switchyard Plan, which depicts the existing switchyard and the additions for the BESS system. Since the existing switchyard includes an extra bay position, the overall footprint of the switchyard will not need to be expanded. Please also refer to Figure B2 for the updated one-line diagram included in this response.



- NOTES
- TEMPORARY SHIELDING SYSTEM SHALL BE RELOCATED AS SUCCESSIVE UNITS ARE INSTALLED.
 - LIGHTING CIRCUITS CONSISTS OF (2) TWO 240 VOLT CIRCUITS FOR LIGHTS & (1) ONE 120 VOLT CIRCUIT FOR RECEPTACLES.

LEGEND

ROADWAY CROSSING TRENCH



PRELIMINARY

NOT FOR CONSTRUCTION

jburfison C:\Jobs\SEGS\CAD\SEGS-BESS-EC-2.dwg Layout1 Dec 18, 2019 - 10:31am

THIS DRAWING WAS PREPARED BY POWER ENGINEERS, INC. FOR A SPECIFIC PROJECT. TAKING INTO CONSIDERATION THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING OR ANY INFORMATION CONTAINED IN THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH POWER AND POWER'S CLIENT IS GRANTED.

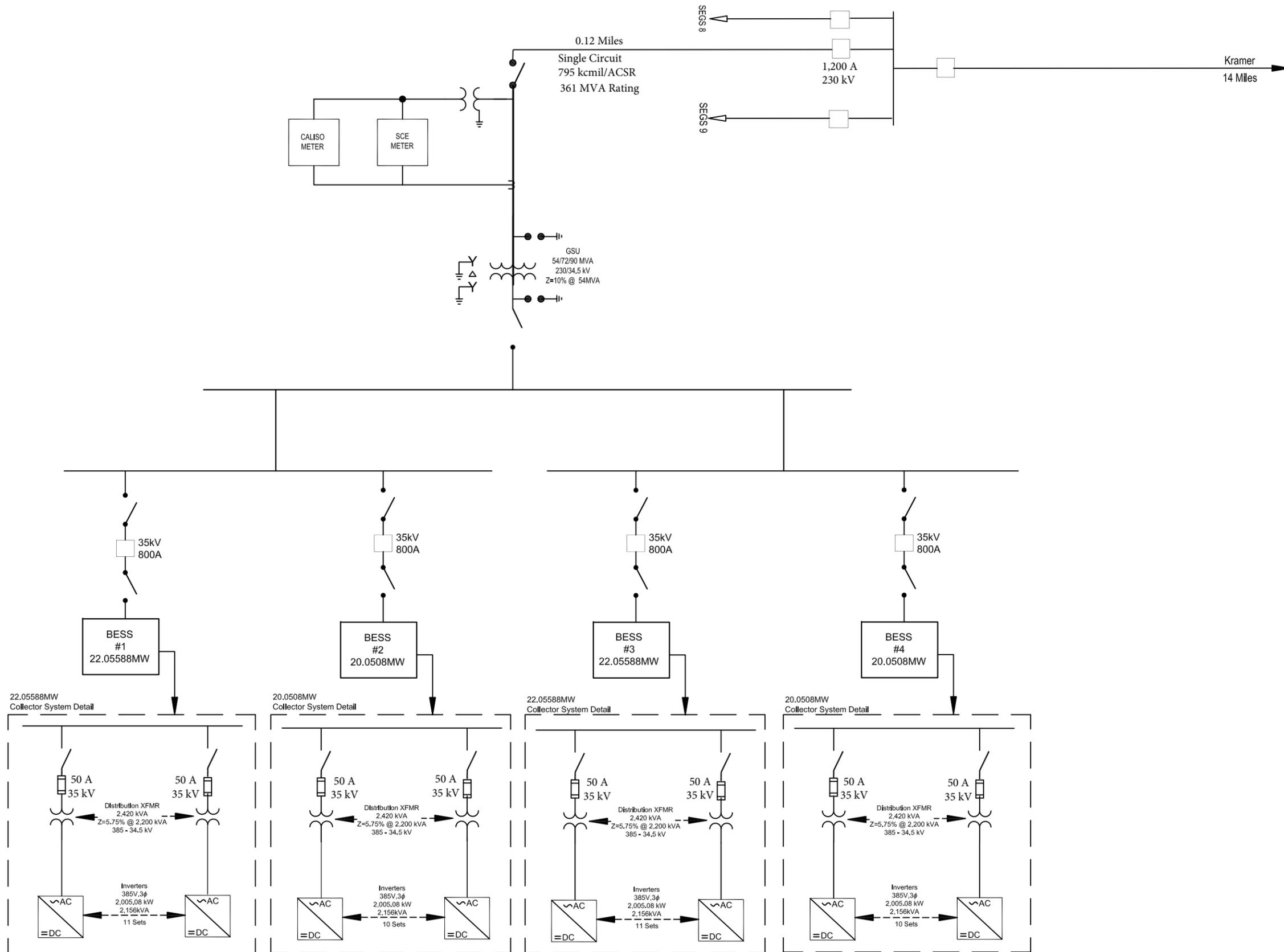
REFERENCE DRAWINGS:

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
3	ADDED BESS	12/06/19	LJB			

DSGN						
DRN						
CKD						
SCALE:	AS NOTED					
	FOR 22x34 DWG ONLY					



JOB NUMBER	158105	REV	3
SEGS VIII & IX with SEGS BESS		DRAWING NUMBER	
Figure B1: 230kV COMMON SWITCHYARD PLAN		SEGS-BESS-EC-2	



NOTES

1. THIS IS A PRELIMINARY SINGEL-LINE DIAGRAM AND REPRESENTS ONE PROPOSED ARRANGEMENT. AS A PRELIMINARY SINGLE-LINE DIAGRAM IT IS NOT FOR CONSTRUCTION AND IS SUBJECT TO CHANGE BASED UPON THE DETAILED DESIGN.

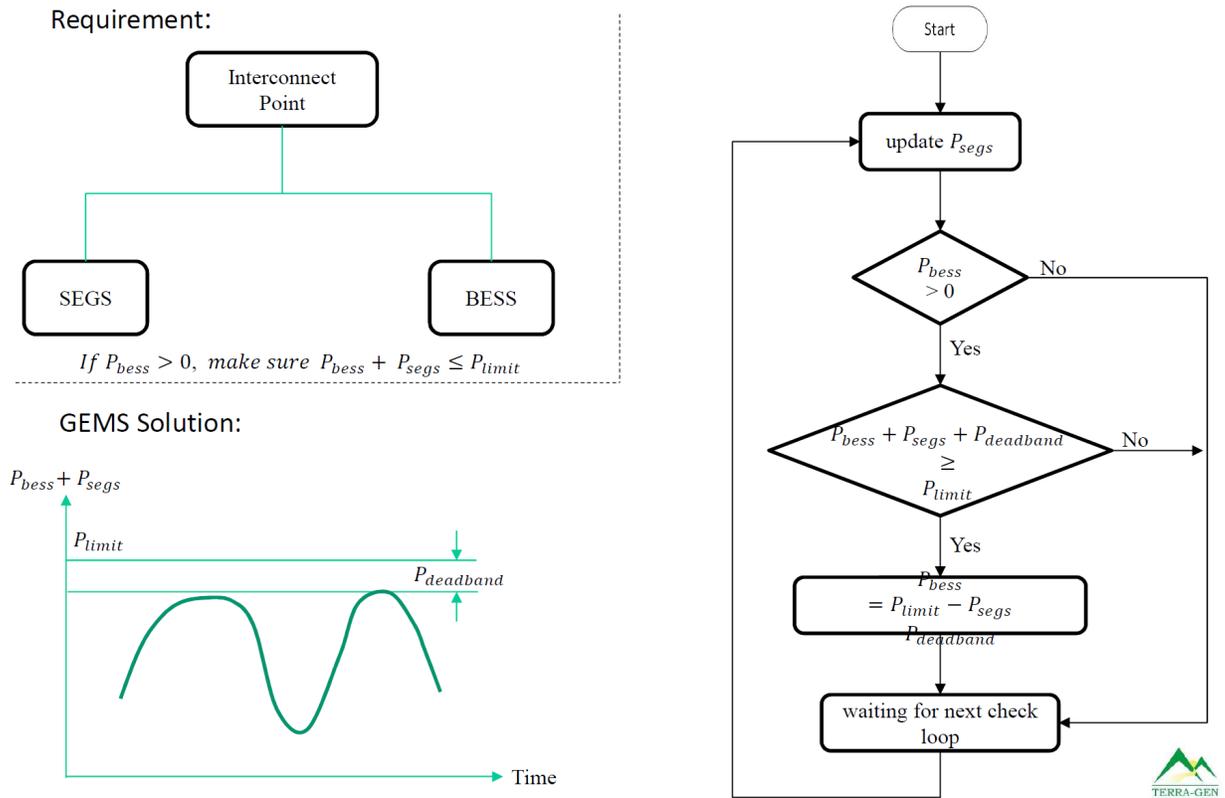
	TERRA-GEN	JOB NUMBER	REV
	SEGS VIII BESS & SEGS IX BESS		1
	Figure B2: One Line Diagram	DRAWING NUMBER	SEGB-1

Data Request B2: Please describe and provide a schematic diagram of the feedback control schemes that have been proposed to regulate the net output of the SEGS VIII and SEGS IX, after the addition of the Battery Energy Storage System (BESS), so as not to exceed 160 Mega Watt (MW) at the point of interconnection to the California Independent System Operator (California ISO) grid.

RESPONSE

A new energy management system will be overlaid across the existing SEGS VIII and IX facility and the BESS to continuously monitor the output of each facility and modulate accordingly to ensure the interconnection limit is not exceeded. A feedback control diagram is provided below in Figure B3.

Figure B3: Feedback Control Diagram



Data Request B3: *Since the BESS would be charging from the California ISO control grid, a load interconnection agreement is needed from the utility provider to ensure the existing transmission system is capable of delivering the needed power for the battery for charging under the worst condition. Please provide a load interconnection agreement from the*

RESPONSE

A request for a Material Modification Assessment (MMA) was submitted on July 10, 2019 to Southern California Edison (SCE) and CAISO to add the BESS to the facility. The MMA request is in process, and has not been finalized to date. As a part of the MMA process, the interconnection agreement will be modified to address the charging capacity/demand of the BESS.

Data Request B4: *Please discuss the expected method of operation of the BESS at different times of day and describe how it would be utilized to regulate the voltage and frequency of the system.*

RESPONSE

Based on historical market pricing, one operating scenario for the BESS will be to charge the system during afternoon hours with lower market prices (due to high solar generation in the CAISO market) for the design duration of the storage system (up to 2 hours) and then discharge in the late evening hours after solar generation subsides. The BESS will participate in the ancillary service markets in CAISO which may change the charging and discharging strategy depending on the time of year and evolution of the CAISO market. Flexibility is one of the key advantages of energy storage in supporting the CAISO controlled grid.

Section 8.3.4 of the CAISO Tariff describes the certification and testing requirements of resources seeking to provide Ancillary Services within the CAISO Markets. [The CAISO does not operate a Frequency Market as does some other Regional Transmission Operators (RTOs.)] Within this section of the Tariff, it references that “Each resource used to bid Regulation or used to self-provide Regulation must have been certified and tested by the CAISO using the process defined in Part A of Appendix K.” The Ancillary Services Requirements Protocol of Appendix K describes in detail in Part A the operating, technical, and monitoring requirements of resources seeking to provide regulation services to the CAISO Markets.

Regulation Service is procured largely in the day-ahead market of the CAISO. As such, the inverter-based technology of the BESS will offer MW amounts to the CAISO on a day-ahead basis. Regulation service will be provided for both Regulation-Up (providing output to the grid in 4 second pulses) and Regulation-Down (receiving output from the grid in 4 second pulses). These two services will be offered in addition to renewable energy firming in which the energy storage unit will be used to supplement energy scheduled from the solar facility during periods of loss of solar resource (clouds, etc.).

PUBLIC HEALTH, TRANSMISSION LINE SAFETY AND NUISANCE

BACKGROUND

The petitioner is proposing the addition of a BESS with a maximum capacity of up to 80 MW to the existing SEGS VIII and IX.

Data Request B5: *Please provide the distance from the facility to the closest following receptors: 1) residential, 2) offsite worksite, and 3) airport.*

RESPONSE

The following are the distances from the SEGS VIII and IX project boundary to the nearest receptors:

- Distance to nearest residence is 7.2 miles from project: Residence at 42201 Friends Rd, Hinkley, CA 92347
- Distance to nearest business/offsite worksite is 10.2 miles from project: Multiple gas stations and restaurants at Kramer Junction – 6158 E, CA-58, Boron, CA 93516
- Distance to nearest airport is 14.1 miles: Baron Airstrip - 27664 Morgan Ln, Boron, CA 93516

Data Request B6: *Figure 1 of the petition includes the proposed BESS. Figure 1 shows the outer property boundary but does not include boundaries for SEGS VIII and IX. The CEC has separate licenses for SEGS VIII and IX. Please provide information on where the equipment would be located with respect to SEGS VIII and IX project boundaries in order to assist staff in determining if any additional condition of certification would need to be included on one or both licenses.*

RESPONSE

The BESS would be located within the shared SEGS VIII and SEGS IX project site footprint, between the SEGS VIII and IX solar fields where existing shared project facilities are located. Since the proposed BESS would be jointly used by SEGS VIII and IX, conditions of certification for both projects would be applicable.

Data Request B7: Please provide a description on the proposed overhead transmission line shown in Figure 3: SEGS Electrical Configuration –Onsite Switchyard View of the Data Request Responses (TN 229725). Please include the type of line, approximate length, and applicable codes and standards.

RESPONSE

The new overhead transmission line connecting the BESS to the existing on-site switchyard will be a single circuit 230 kV line approximately 600 feet in length. The line will be designed and constructed to meet the requirements of California General Order 95. Please refer to Figure B2, above, which includes an updated one-line diagram with the additional requested details.

WORKER SAFETY AND FIRE PROTECTION

BACKGROUND

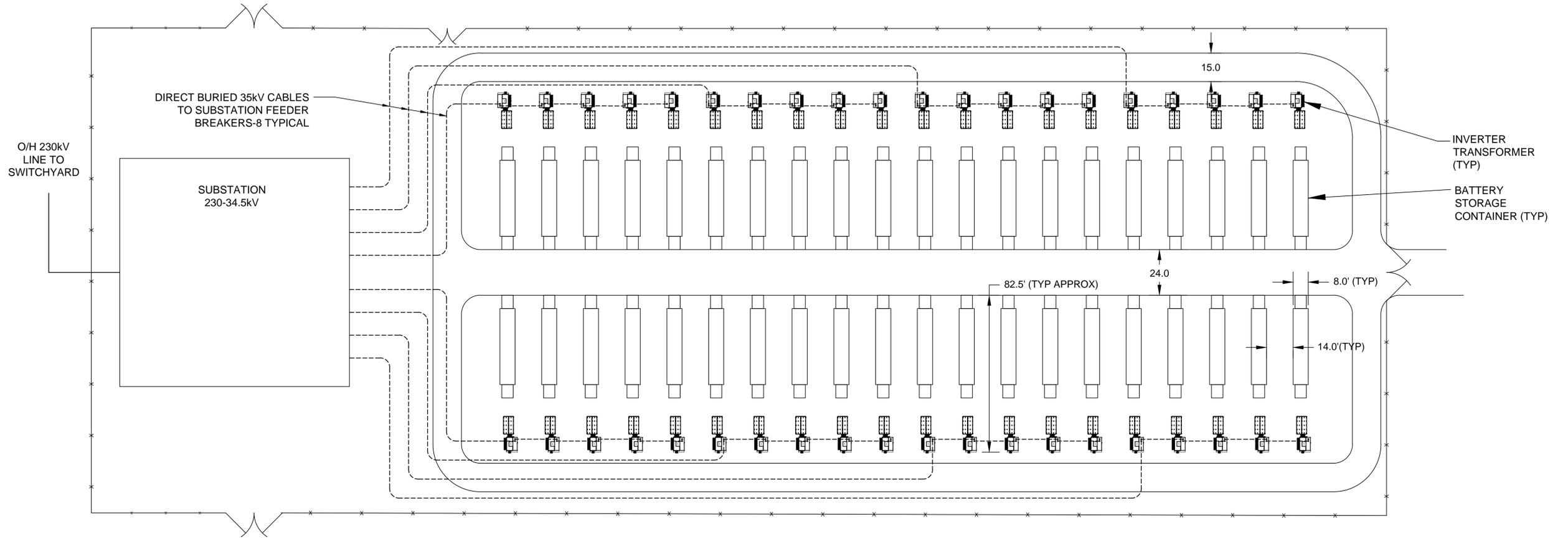
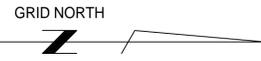
On page 2-2 of the petition, the project owner states that the BESS could be in a container or within an enclosure constructed on site. However, no further information is given on the definition of the BESS enclosure.

Data Request B8: *Please provide a written description of what the BESS enclosure would be and provide the dimensions of the enclosure and the associated California Building Code occupancies. In addition, please provide a dimensional plan view of the maximum build out for the BESS that would use containers and for the BESS that would use enclosures.*

RESPONSE

Based on the latest BESS system design plans, rather than a single building room or enclosure, the proposed BESS system will utilize non-walk-in, outdoor containers, or cabinets that contain the components of the energy storage system such that personnel cannot enter the enclosure other than reaching in to access components for maintenance purposes. Therefore, with this containerized approach, there will be no occupied enclosures.

A typical layout is provided in Figure B4, SEGS VIII and IX BESS System Layout. Container dimensions may vary depending on the BESS System manufacturer selected.



jburison C:\Jobs\SEGS\CAD\SEGS-BESS-EC-1.dwg Layout1 Dec 09, 2019 - 2:39pm

THIS DRAWING WAS PREPARED BY POWER ENGINEERS, INC. FOR A SPECIFIC PROJECT. TAKING INTO CONSIDERATION THE SPECIFIC AND UNIQUE REQUIREMENTS OF THE PROJECT. REUSE OF THIS DRAWING OR ANY INFORMATION CONTAINED IN THIS DRAWING FOR ANY PURPOSE IS PROHIBITED UNLESS WRITTEN PERMISSION FROM BOTH POWER AND POWER'S CLIENT IS GRANTED.

REFERENCE DRAWINGS:

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
A	FOR REVIEW	12/9/19	LJB			

DSGN	
DRN	
CKD	
SCALE:	AS NOTED
FOR 22x34 DWG ONLY	

SCALE: 1" = 30'



TERRA GEN

SEGS VIII IX

Figure B4: BESS SYSTEM LAYOUT

JOB NUMBER	REV
158105	A
DRAWING NUMBER	
SEGS-BESS-EC-1	

BACKGROUND

On page 2-1 of the petition, the project owner states that lithium-ion cells would be the basis of the BESS. However, the exact chemistry of the lithium-ion battery has not been provided.

Data Request B9: Please describe the lithium ion chemistry being proposed for the BESS.

RESPONSE

Either Lithium Nickel Manganese Cobalt Oxide (known as NMC) or Lithium Iron Phosphate (known as LFP) are the expected lithium ion chemistries to be considered for the final design of the BESS, as these two chemistries are the most readily manufactured and commonly deployed.

BACKGROUND

On page 2-2 of the petition, the project owner mentions the elements of the fire protection system for the BESS. However, there are several code elements that have not been mentioned as a part of the fire safety of the BESS.

Data Request B10: Please provide a hazard mitigation analysis for the lithium ion BESS as defined per National Fire Protection Association (NFPA) 855 section 4.1.4.

RESPONSE

The fire protection system design details will vary depending on the final suppliers chosen for the BESS system. Therefore, these details will not be available prior to selection of the key suppliers and system design and engineering is complete. At that time, the project owner will seek approval of the fire protection system from the San Bernardino County Fire Marshal.

A hazard mitigation analysis will be specific to the final manufacturer of the BESS components and final system design, and therefore, will be developed (if required) after key suppliers for the BESS are selected and system design and engineering is complete.

For a containerized design as planned, a hazard mitigation analysis is not expected to be required for Authority Having Jurisdiction (AHJ)/San Bernardino County Fire Department review and approval. According to the NFPA 855 standard, a hazard mitigation analysis is required when one of the following conditions are present:

1) The battery technologies provided are not addressed in Table 1.3.

SEGS VIII and IX intends to use lithium ion battery storage technology, which is an established battery storage technology addressed in Table 1.3.

2) More than one ESS technology is provided in a room or indoor area where adverse interaction between the technologies is possible. (

The SEGS VIII and IX project will not have more than one ESS technology and the proposed BESS will not be located within a room or indoor area. The BESS will be located in outdoor cabinets where personnel cannot enter the enclosure other than reaching in to access components for maintenance purposes.

3) When allowed as a basis for increasing maximum stored energy as specified in 4.8.1 and 4.8.2.

4.8.1 and 4.8.2 are only applicable to BESS located in buildings. As previously stated, the proposed SEGS VIII and IX BESS will not be located within a room or building.

Data Request B11: Please describe the process through which the lithium ion BESS would be certified as Underwriters Laboratories (UL) 9540 compliant.

RESPONSE

Each manufacturer has the responsibility for compliance with and the necessary testing recommended by the UL 9540 standard. For the SEGS BESS, it is expected that the battery enclosure system will be UL 9540 compliant.

Data Request B12: Please provide the results of any UL 9540A testing that has been done on the lithium ion BESS design to be used on the project site.

RESPONSE

The project owner will ensure that the modules selected for use in the BESS will be tested and certified to the UL 9540A standard. As described previously, since the final manufacturers have not been selected, these results of these tests are not yet available.

Data Request B13: Please describe how the thermal runaway protection would be enacted on the lithium ion BESS.

RESPONSE

Thermal runaway detection systems are implemented in each manufacturer's design that will continuously monitor and detect pre-cursors to potential thermal runaway events. The mechanism for detecting pre-cursors of thermal runaway include the detection of off-gases (Carbon Monoxide) or infra-red flame detection depending on the manufacturer. In each case, propagation of thermal runaway is stopped at multiple levels in the design and in the case of early thermal runaway detection, the batteries will be immediately isolated and power exchange will be stopped.

Data Request B14: Please describe how the lithium ion BESS would employ explosion control per NFPA 855 section 4.12.

RESPONSE

The explosion control design will be dependent on the final manufacturer. However, it is expected that if the manufacturer's design contains compartments or enclosures that could be subject to build up of pressure, the system design will include a pressure relief mechanism for explosion control in compliance with the NFPA 855 standard.

Data Request B15: Please describe if there is a water supply and or fire hydrants near the lithium-ion BESS.

RESPONSE

The existing SEGS VIII and IX plants have a fire water system in place with hydrants. The firewater storage tank is located in the same area as the proposed BESS, north and east of the existing control room and on-site switchyard. There are two fire hydrants within approximately 100 feet of the proposed BESS area. Additional firewater piping and hydrants will be deployed as needed based on the final system design.

ATTACHMENT A

DATA REQUEST LETTER FROM CALIFORNIA ENERGY COMMISSION

DOCKETED

Docket Number:	88-AFC-01C
Project Title:	Compliance - Application for Certification for LUZ Solar Electric Generating Systems Cogeneration Unit VIII
TN #:	230873
Document Title:	SEGS 8 and - BESS DR Set 2 final
Description:	N/A
Filer:	Chester Hong
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	11/27/2019 10:09:40 AM
Docketed Date:	11/27/2019



November 27, 2019

Dan Thompson
Vice President Origination and Development
Terra-Gen
11455 El Camino Real, Suite 160
San Diego, California 92130

**SOLAR ENERGY GENERATING SYSTEMS VIII AND IX PETITION FOR
POST CERTIFICATION CHANGE TO ADD A BATTERY ENERGY
STORAGE SYSTEM**

**DATA REQUEST SET 2
(88-AFC-01C & 89-AFC-01C)**

Dear Mr. Thompson:

California Energy Commission (CEC) staff requests the information specified in the enclosed data requests regarding the proposal to add battery storage at the Solar Energy Generating Systems (SEGS) VIII & IX site (88-AFC-01C and 89-AFC-01C).

These data requests, numbered B1 through B15, are being made to the technical areas of Transmission System Engineering, Public Health, Transmission Line Safety and Nuisance and Worker Safety and Fire Protection. Written responses to the enclosed data requests are due as soon as possible.

If you have any questions regarding the enclosed data requests, please call me at (916) 653-8236 or email me at John.Heiser@energy.ca.gov.

Sincerely,

John Heiser
Compliance Project Manager

Enclosure (Data Request Packet)
cc: Docket 88-AFC-01C
89-AFC-01C

POST-CERTIFICATION PETITION FOR SOLAR ENERGY GENERATING SYSTEM VIII & IX BATTERY ENERGY STORAGE SYSTEM (88-AFC-01C & 89-AFC-01C)

CEC Staff's Data Requests Set 2, B1 – B15

Technical Area: Transmission System Engineering
Author: Laiping Ng

DATA REQUESTS

- B1. Provide a detailed description of any changes in design, construction, and operation of any electric transmission facilities associated with the addition of energy storage and to the existing SEGS VIII and IX facilities. Providing descriptions and drawing of both the existing and proposed facilities would be the most effective way to communicate the proposed changes.
- B2. Please describe and provide a schematic diagram of the feedback control schemes that have been proposed to regulate the net output of the SEGS VIII and SEGS IX, after the addition of the battery energy storage system (BESS), so as not to exceed 160 Mega Watt (MW) at the point of interconnection to the California Independent System Operator (California ISO) grid.
- B3. Since the BESS would be charging from the California ISO control grid, a load interconnection agreement is needed from the utility provider to ensure the existing transmission system is capable of delivering the needed power for the battery for charging under the worst condition. Please provide a load interconnection agreement from the
- B4. Please discuss the expected method of operation of the BESS at different times of day and describe how it would be utilized to regulate the voltage and frequency of the system.

Technical Areas: Public Health, Transmission Line Safety and Nuisance
Author: Nancy Fletcher

BACKGROUND

The petitioner is proposing the addition of a BESS with a maximum capacity of up to 80 MW to the existing SEGS VIII and IX.

DATA REQUESTS

- B5. Please provide the distance from the BESS facility to the closest following receptors: 1) residential, 2) offsite worksite, and 3) airport.
- B6. Figure 1 of the petition includes the proposed BESS. Figure 1 shows the outer property boundary but does not include boundaries for SEGS VIII and IX. The CEC has separate licenses for SEGS VIII and IX. Please provide information on the where the equipment would be located with respect to SEGS VIII and IX project boundaries in order to assist staff in determining if any additional condition of certification would need to be included on one or both licenses.
- B7. Please provide a description on the proposed overhead transmission line shown in Figure 3: SEGS Electrical Configuration – Onsite Switchyard View of the Data Request Responses (TN 229725). Please include the type of line, approximate length, and applicable codes and standards.

Technical Area: Worker Safety and Fire Protection
Author: Brett Fooks

BACKGROUND

On page 2-2 of the petition, the project owner states that the BESS could be in a container or within an enclosure constructed on site. However, no further information is given on the definition of the BESS enclosure.

DATA REQUEST

- B8. Please provide a written description of what the BESS enclosure would be and provide the dimensions of the enclosure and the associated California Building Code occupancies. In addition, please provide a dimensional plan

view of the maximum build out for the BESS that would use containers and for the BESS that would use enclosures

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On page 2-1 of the petition, the project owner states that lithium-ion cells would be the basis of the BESS. However, the exact chemistry of the lithium-ion battery has not been provided.

DATA REQUEST

B9. Please describe the lithium-ion chemistry being proposed for the BESS.

BACKGROUND

On page 2-2 of the petition, the project owner mentions the elements of the fire protection system for the BESS. However, there are several code elements that have not been mentioned as a part of the fire safety of the BESS.

DATA REQUESTS

- B10. Please provide a hazard mitigation analysis for the lithium-ion BESS as defined per National Fire Protection Association (NFPA) 855 section 4.1.4.
- B11. Please describe the process through which the lithium-ion BESS would be certified as Underwriters Laboratories (UL) 9540 compliant.
- B12. Please provide the results of any UL 9540A testing that has been done on the lithium-ion BESS design to be used on the project site.
- B13. Please describe how thermal runaway protection would be enacted on the lithium-ion BESS.
- B14. Please describe how the lithium-ion BESS would employ explosion control per NFPA 855 section 4.12.
- B15. Please describe if there is a water supply and or fire hydrants near the lithium-ion BESS.