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July 18, 2023

Via Hand Delivery

Melanie A. Bachman, Esq.
Executive Director/Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Docket No. 505 – Application of Haddam Quarter Solar, LLC, a wholly owned subsidiary of Louth Callan Renewables, for a Certificate of Environmental Compatibility and Public Need for the Construction, Maintenance and Operation of a 2.8 MW/AC Solar Photovoltaic Project Off Johnson Lane in Durham, Connecticut**

D&M Plan Interrogatory Responses

Dear Attorney Bachman:

On behalf of Haddam Quarter Solar, LLC (the "Applicant"), enclosed please find the original and fifteen (15) copies of the Applicant's Responses to Council Interrogatories related to Docket No. 505 Development and Management Plan. Electronic copies of these responses have also been sent to the Council today.

If you have any questions or need any additional information, please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

KCB/kia
Enclosure

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:	:	
	:	
APPLICATION FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR THE CONSTRUCTION, MAINTENANCE AND OPERATION OF A 2.8 MW/AC SOLAR PHOTOVOLTAIC PROJECT OFF JOHNSON LANE, DURHAM, CONNECTICUT	:	DOCKET NO. 505
	:	JULY 18, 2023

RESPONSES OF HADDAM QUARTER SOLAR, LLC
TO CONNECTICUT SITING COUNCIL D&M PLAN INTERROGATORIES

On June 27, 2023, the Connecticut Siting Council ("Council") issued D&M Plan Interrogatories to Haddam Quarter Solar, LLC ("Applicant"), relating to Docket No. 505. Below are the Applicant's responses.

Question No. 1

Referencing D&M Sheet GN-2 and Council Decision and Order item no. 2(c), identify the location of the construction laydown area.

Response

The construction laydown area will be in the southeast portion of the Site within the proposed Limit of Disturbance adjacent to the Temporary Stockpile area.

Question No. 2

Referencing D&M Sheet GN-2 and Council Decision and Order item no. 2(b), provide site stabilization seeding/growing season details that would be implemented prior to commencement of Phase 2.

Response

Details related to seeding and site stabilization are found on Sheet EC-1, Sedimentation

& Erosion ("E&S") Control Plan Notes. All areas disturbed as part the Phase 1 construction are to be seeded and mulched prior to moving on to Phase 2. There is no requirement to await site and soil stabilization for a growing season before the Petitioner can move on to Phase 2 of the E&S Control Plan. There is a requirement for a growing season of site stabilization before the Petitioner installs the solar racking system.

Question No. 3

Referencing D&M Sheet EC-1 and Council Decision and Order item no. 2(b), during construction, at what intervals would the sediment traps require cleaning? What equipment would be used to remove accumulated sediment? Where would the sediment be disposed of?

Response

As stated on Drawing EC-1, temporary sediment traps will be inspected weekly and within 24 hours of rainfall exceeding 0.5". Accumulated sediment will generally be removed if/when the basins reach approximately 50% capacity. The sediment will be temporarily stored on site and will either be reused on-site (if possible) or will be disposed of off-site. Based on the contractor's field assessment of the construction and/or site stabilization status at the time, the contractor will remove the built-up sediment by generally accepted construction methods/equipment, which may include removal by hand.

Question No. 4

Referencing D&M Sheet EC-1, construction notes reference a revised Stormwater Pollution Control Plan dated 2023. Has the referenced plan been approved by DEEP as part of the Stormwater Permit for the site?

Response

No. The Stormwater Permit registration is still being reviewed by DEEP.

Question No. 5

Referencing D&M Sheet GD-1, are the gravel drip edge controls required by DEEP?

Response

The gravel drip edge controls shown on the drawings (Sheet GD-1) were included following consultation with DEEP Stormwater personnel during a site walk on December 12, 2021. Because no application for DEEP General Permit approval had been submitted at that time, the consultation was informal, and the drip edge controls were added voluntarily.

Question No. 6

Referencing D&M Sheet DN-1, the Farm Fence details shows a fence fabric of varying sizes. What is the mesh size along the bottom and top portions? Is it possible to install a fence with a mesh size along the bottom that allows for small animal passage, or in the alternative, install the fence so that the bottom of the fence is 6 inches above grade?

Response

The mesh size for the fence will be six (6) inches. The bottom of the fence will be installed sic (6) inches above grade.

Question No. 7

Referencing D&M Sheet T-001, the Project output (System Size) has been reduced from 2.8 MW AC (approved 2021) to 1.95 MW AC and includes a different solar panel manufacture/model.

a) Explain why the project output was reduced.

b) Provide specification sheets for the selected panels.

c) Provide Toxicity Characteristic Leaching Procedure (TCLP) test results for the selected solar panels that indicate the panels would not be characterized as hazardous waste at the time of disposal, under current testing criteria? If yes, provide revised information and

specification sheets.

Response

a) The project output was reduced in order to be eligible for the Non-Residential Renewable Energy Solutions (NRES) program which requires all project sizes to be below 2 MW.

b) The module datasheet for the VSUN550-144BMH-DG panels is included in Attachment 1.

c) The Toxicity Characteristic Leaching Procedure (TCLP) test results for the VSUN535-144BMH-DG are included in Attachment 2. Also included in Attachment 2 is a letter of explanation from VSUN confirming that that the TCLP results for VSUN535 and VSUN550 modules are the same. According to VSUN, TCLP test results for the VSUN550 modules are not available.

Question No. 8

Referencing D&M Sheet T-001, 13 string inverters are specified.

a) What are the operational noise characteristics of the inverters?
b) Is it possible to relocate inverter #'s 11, 12, and/or 13 on the panel rows farther from Johnson Lane?
c) Provide specification sheets for the selected inverters.

Response

a) The inverters, located in the southwest portion of the site, near the electrical equipment pad emits a maximum noise of 69 dB at one meter (3.28 feet) from the unit. These noise levels occur when the inverters are in full service, usually between the hours of 10 a.m. to 2 p.m. daily.

b) As mentioned above, all the inverters are centrally located in the southwest portion of the site, next to the proposed equipment pad. References on the D&M Plans to DCB Nos. 11, 12 and 13 near Johnson Lane, at the eastern end of panel rows 22, 25 and 26, respectively are "combiner boxes" and not inverters. The combiner boxes are located on some of the rows and have a

dimension of 2.5’ X 2.5’ X 0.75’ and do not emit any noise.

c) The inverter datasheet is included in Attachment 3.

Question No. 9

Given that the D&M Plan specifies different facility components than originally proposed, would operation of the proposed facility meet the applicable DEEP Noise Standards at the nearest property boundary? What would be the collective noise level from operation of the transformers/switchgear/string inverters at the nearest property boundary?

Response

Major equipment on the project site includes 13 inverters, 1 transformer, 1 switchgear and 1 switchboard. The inverters emit a maximum noise of 69 dB at a distance of one meter (3.28 feet) feet from the unit, during periods of maximum production, usually between 10 am to 2 pm daily. The transformer emits a maximum noise level of 61 dB at one meter (3.28 feet) during its operation, which, like the inverters, will be during the day. The nearest property line to the inverters and the transformer is 77 feet away adjacent to Johnson Lane to the south. At this closest property line, the maximum decibel level will not exceed 55 dB during the day, which is below the maximum noise level allowed by the Town of Durham.

Question No. 10

The Operation and Maintenance Plan references sheep grazing (pp. 18 & 28). Will a sheep grazing plan be implemented at this site? If yes, provide a detailed grazing plan.

Response

We will not be having sheep grazing at this site. Attachment 4 includes a revised Operation and Maintenance Plan removing the reference to sheep grazing.

ATTACHMENT 1

VSUN
Innovative & Smart

最も信頼出来る再エネパートナー

VSUN550-144BMH-DG

VSUN550-144BMH-DG VSUN545-144BMH-DG
VSUN540-144BMH-DG VSUN535-144BMH-DG

550W
Highest power output

12 years
Material & Workmanship warranty

21.52%
Module efficiency

30 years
Linear power output warranty

KEY FEATURES

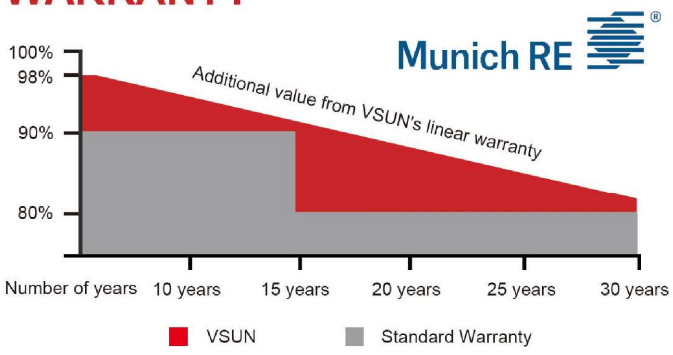
- MBB technology with Circular Ribbon
- Higher output power
- Half-cell Technology
- Positive tolerance offer
- Micro Gap
- Up to 30% extra power generation yield from the back side
- Certified for salt/ammonia corrosion resistance
- Load certificates: wind to 2400Pa and snow to 5400Pa
- Lower LCOE

ABOUT US

VSUN, a BNEF Tier-1 PV module manufacturer invested by Fuji Solar, has been committed to providing greener, cleaner and more intelligent renewable energy solutions. VSUN is dedicated to bringing reliable, customized and high-efficient products into various markets and customers worldwide.

PRODUCT CERTIFICATION

WARRANTY



Electrical Characteristics at Standard Test Conditions(STC)

Module Type	VSUN550-144BMH-DG	VSUN545-144BMH-DG	VSUN540-144BMH-DG	VSUN535-144BMH-DG
Maximum Power - Pmax (W)	550	545	540	535
Open Circuit Voltage - Voc (V)	49.92	49.81	49.65	49.5
Short Circuit Current - Isc (A)	13.99	13.92	13.85	13.78
Maximum Power Voltage - Vmpp (V)	42	41.8	41.65	41.5
Maximum Power Current - Impp (A)	13.1	13.04	12.97	12.9
Module Efficiency	21.52%	21.32%	21.13%	20.93%

Standard Test Conditions (STC): irradiance 1,000 W/m²; AM 1,5; module temperature 25°C. Pmax Sorting : 0~5W. Measuring Tolerance: ±3%.

Remark: Electrical data do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

Electrical Characteristics with different rear side power gain(reference to 545 front)

Pmax (W)	Voc (V)	Isc (A)	Vmpp (V)	Impp (A)	Pmax gain
575	49.76	14.69	41.80	13.76	5%
602	49.76	15.39	41.80	14.41	10%
656	49.81	16.79	41.75	15.72	20%
684	49.81	17.49	41.75	16.38	25%

Material Characteristics

Dimensions	2256×1133×35mm (L×W×H)
Weight	32.5kg
Frame	Silver anodized aluminum profile
Front Glass	AR-Coating toughened glass, 2.0mm
Cell Encapsulation	EVA or POE
Back Glass	Glazed & Semi-toughened safety glass, 2.0mm
Cells	12×12 pieces bifacial monocrystalline solar cells series strings
Junction Box	IP68, 3 diodes
Cable&Connector	Potrait: 500 mm (cable length can be customized) , 1×4 mm 2 , compatible with MC4

Temperature Characteristics

NOCT	45°C(±2°C)
Voltage Temperature Coefficient	-0.27%/°C
Current Temperature Coefficient	+0.048%/°C
Power Temperature Coefficient	-0.32%/°C

Maximum Ratings

Maximum System Voltage [V]	1500
Series Fuse Rating [A]	30
Bifaciality	70%±5%

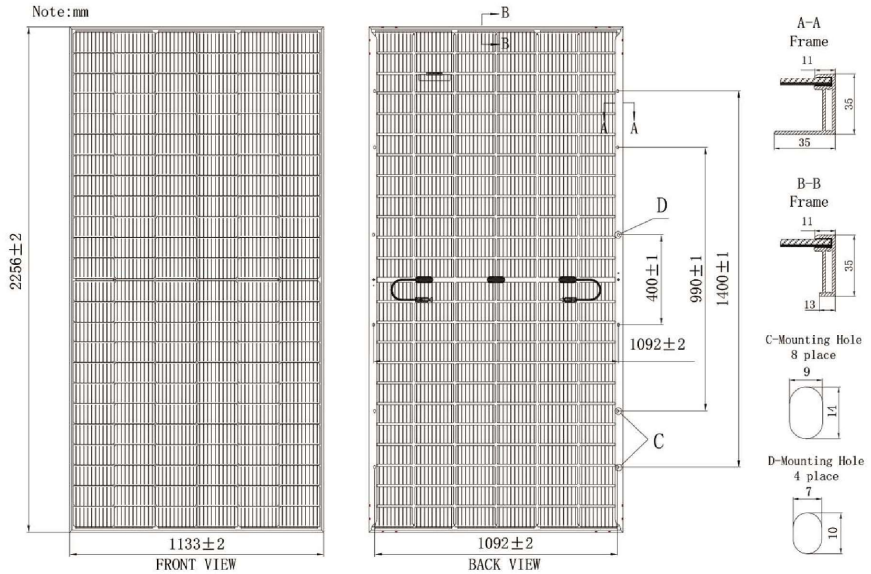
Packaging

Dimensions(L×W×H)	2290×1125×1253mm
Container 20'	150
Container 40'	300
Container 40'HC	600

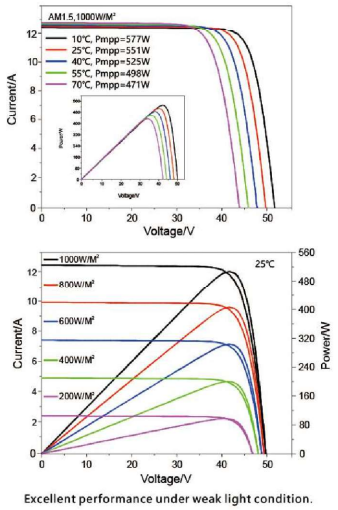
System Design

Temperature Range	-40 °C to + 85 °C
Withstanding Hail	Maximum diameter of 25 mm with impact speed of 23 m/s
Maximum Surface Load	5,400 Pa
Application class	class A

Dimensions



IV-Curves



Excellent performance under weak light condition.

ATTACHMENT 2

TEST REPORT

CLIENT DETAILS

Contact	Dengrong CAI
Client	VIETNAM SUNERGY JOINT STOCK COMPANY
Address	Lot III-Dong Vang Area,Dinh Tram Industrial Zone,Viet Yen District,Bac Giang Province 230000
Telephone	-
Facsimile	-
Email	dengrong.cai@vsunsolar.com
Order Number	-
Samples	Solid waste(1)
Project	-

LABORATORY DETAILS

Manager	SGS-CSTC
Laboratory	Environment Laboratory
Address	2/F, 3RD BUILDING NO. 889, YISHAN ROAD, XUHUI DISTRICT, SHANGHAI, CHINA
Telephone	+86 (21) 6140 2666-2002
Facsimile	+86 (21) 6115 2164
Email	REPORT.ENV @SGS.COM
Report Number	SHE22-03541 R0
SGS Reference	0000240737
Date Reported	2022/09/08
Analysis Date	2022/08/29 - 2022/09/08

COMMENTS

1.The results apply to the received sample(s) VSUN535-144BMH-DG.

SIGNATORIES

Lora Li	Jun Meng	Liqiong TANG
Reported by	Reviewed by	Approved by

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声明
Statement

1. 检测报告无本实验室检验检测专用章无效。

   The test report is invalid without the official seal of the laboratory.

2. 未经本公司书面许可，不得复制 (全文复制除外) 检测报告。

   This test report cannot be reproduced in any way, except in full content, without prior approval in writing by the laboratory.

3. 检测报告无编制、审核、批准人签字无效。

   The test report is invalid without the signature of the compiler, the checker and the approver

4. 检测报告涂改无效。

   The test report is invalid if altered.

5. 本检测报告以中文为准，英文文本（如有）仅为译文，两者发生冲突时，应以中文文本为准。

   The test report has been drafted in Chinese and translated into English (if applicable) for convenience only. In the event of discrepancy, the Chinese version shall prevail.

6. 送检样品的样品类型、样品名称、样品描述、项目名称等信息由客户提供，样品的代表性和真实性由委托人负责。

   The sample type, sample name, sample description, project name and other information of the submitted samples are provided by the client. The representativeness and authenticity of the samples are in the charge of the client.

7. 如未加盖CMA章则仅供内部参考，不具有对社会的证明作用。

   The report is for internal reference only if it is not stamped with CMA mark, it has no proof function to the society.

8. 如对本检测报告有异议，请在收到报告10天之内与本公司联系。

   Should you have any queries or objection to the test report, please contact us within 10 days after receiving the report.

符号表/Legend

"-" 未测试该参数或不适用/The parameter is not tested or not applicable

↑ 提高检出限/Detection limit raised

↓ 降低检出限/Detection limit lowered

ND 未检出/Not Detected

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Parameter	Method	Units	MDL	Testing Results
		Sample Number		22-03541.001
		Sample Name		VS12203170701H
		Test Object		Solid waste
		Sample Description		SHES2208015451TX
		Receive Date		2022/08/29
Arsenic (As)	USEPA 200.8	mg/L	0.050	ND
Barium (Ba)	USEPA 200.8	mg/L	0.010	**0.300**
Cadmium (Cd)	USEPA 200.8	mg/L	0.001	ND
Chromium (Cr)	USEPA 200.8	mg/L	0.010	ND
Lead (Pb)	USEPA 200.8	mg/L	0.010	**10.3**
Selenium (Se)	USEPA 200.8	mg/L	0.050	ND
Silver (Ag)	USEPA 200.8	mg/L	0.010	ND
Mercury (Hg)	USEPA 7473	mg/L	0.005	ND
Benzene	USEPA 8260D	mg/L	0.0005	ND
Carbon tetrachloride	USEPA 8260D	mg/L	0.0005	ND
Chlorobenzene	USEPA 8260D	mg/L	0.0005	ND
Chloroform	USEPA 8260D	mg/L	0.0005	ND
1,4-Dichlorobenzene	USEPA 8260D	mg/L	0.0005	ND
1,2-Dichloroethane	USEPA 8260D	mg/L	0.0005	ND
1,1-Dichloroethene	USEPA 8260D	mg/L	0.0005	ND
2-butanone(MEK)	USEPA 8260D	mg/L	0.020	ND
Tetrachloroethene	USEPA 8260D	mg/L	0.0005	ND
Trichloroethene	USEPA 8260D	mg/L	0.0005	ND
Vinyl chloride	USEPA 8260D	mg/L	0.0005	ND
Methylphenol[1]	USEPA 8270E	mg/L	0.001	ND
2-Methylphenol	USEPA 8270E	mg/L	0.0005	ND
3&4-Methylphenol	USEPA 8270E	mg/L	0.0005	ND
2,4-Dinitrotoluene	USEPA 8270E	mg/L	0.0005	ND
Hexachlorobenzene	USEPA 8270E	mg/L	0.0005	ND
Hexachlorobutadiene	USEPA 8270E	mg/L	0.0005	ND
Hexachloroethane	USEPA 8270E	mg/L	0.0005	ND
Nitrobenzene	USEPA 8270E	mg/L	0.0005	ND
Pentachlorophenol	USEPA 8270E	mg/L	0.0025	ND
Pyridine	USEPA 8270E	mg/L	0.002	ND
2,4,5-Trichlorophenol	USEPA 8270E	mg/L	0.0005	ND
2,4,6-Trichlorophenol	USEPA 8270E	mg/L	0.0005	ND
Chlordane(Total)[2]	USEPA 8270E	mg/L	0.001	ND
Endrin	USEPA 8270E	mg/L	0.0005	ND
γ-BHC	USEPA 8270E	mg/L	0.0005	ND
Toxaphene	USEPA 8270E	mg/L	0.050	ND
γ-Chlordane	USEPA 8270E	mg/L	0.0005	ND
α-Chlordane	USEPA 8270E	mg/L	0.0005	ND
Methoxychlor	USEPA 8270E	mg/L	0.0005	ND
Heptachlor	USEPA 8270E	mg/L	0.0005	ND
2,4-D*	USEPA 8151A	mg/L	0.0005	ND
2,4,5-TP (Silvex, Fenopop)	USEPA 8151A	mg/L	0.0005	ND

Remark:
1.Methylphenol are the sum of 2-Methylphenol and 3&4-Methylphenol.
2.Chlordane are the sum of α-Chlordane and γ-Chlordane.
3.Preparative method:USEPA1311-1992(Toxicity Characteristic Leaching Procedure)
4.*:Not certificated by CNAS.

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Method List

USEPA 200.8-1994 Metals ICP-MS
USEPA 7473-2007 Metals-Hg
USEPA 8260D-2018 VOCs
USEPA 8270E-2018 SVOCs
USEPA 8151A-1996 Acid Herbicides in Water by GC-MS

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. Testing Center-Environment Laboratory
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Method:USEPA 200.8-1994

Equipment Name	Model	Equipment Number	Serial Number
ICP-MS	Agilent 7900	CHEM-998	JP16311502

Method:USEPA 7473-2007

Equipment Name	Model	Equipment Number	Serial Number
Hg analyzer	Milestone DMA-80	CHEM-958	16041979

Method:USEPA 8260D-2018

Equipment Name	Model	Equipment Number	Serial Number
PT-GC-MS	Agilent TWR-AQUA100/7890B/5977B	CHEM-979	US16083002/CN16243106/US1623M026

Method:USEPA 8270E-2018

Equipment Name	Model	Equipment Number	Serial Number
GC-MS	Agilent 7890B/5977A	CHEM-1118	CN18053182/US1805M023
GC-MS	Agilent 7890A/5975C	CHEM-ENV085	CN12371032/US12362A17

Method:USEPA 8270E-2018

Equipment Name	Model	Equipment Number	Serial Number
GC-MS	Agilent 7890B/5977A	CHEM-1118	CN18053182/US1805M023
GC-MS	Agilent 7890A/5975C	CHEM-ENV085	CN12371032/US12362A17

Method:USEPA 8151A-1996

Equipment Name	Model	Equipment Number	Serial Number
GC-MS	Agilent 6890/5973N	CHEM-ENV002	CN10411075/US40646566
GC-MS	Agilent 7890A/5975C	CHEM-ENV085	CN12371032/US12362A17

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Method Blank(MB)

Parameter	Batch ID	Unit	MDL	MB	Control Range
Metals ICP-MS Method: USEPA 200.8-1994					
Arsenic (As)	LB2226116	mg/L	0.050	<0.050	<0.050
Barium (Ba)	LB2226116	mg/L	0.010	<0.010	<0.010
Cadmium (Cd)	LB2226116	mg/L	0.001	<0.001	<0.001
Chromium (Cr)	LB2226116	mg/L	0.010	<0.010	<0.010
Lead (Pb)	LB2226116	mg/L	0.010	<0.010	<0.010
Selenium (Se)	LB2226116	mg/L	0.050	<0.050	<0.050
Silver (Ag)	LB2226116	mg/L	0.010	<0.010	<0.010
Metals-Hg Method: USEPA 7473-2007					
Mercury (Hg)	LB2225315	mg/L	0.005	<0.005	<0.005
Acid Herbicides in Water by GC-MS Method: USEPA 8151A-1996					
2,4-D	LB2226154	mg/L	0.0005	<0.0005	<0.0005
2,4,5-TP (Silvex, Fenopop)	LB2226154	mg/L	0.0005	<0.0005	<0.0005
VOCs Method: USEPA 8260D-2018					
Benzene	LB2226064	mg/L	0.0005	<0.0005	<0.0005
Carbon tetrachloride	LB2226064	mg/L	0.0005	<0.0005	<0.0005
Chlorobenzene	LB2226064	mg/L	0.0005	<0.0005	<0.0005
Chloroform	LB2226064	mg/L	0.0005	<0.0005	<0.0005
1,4-Dichlorobenzene	LB2226064	mg/L	0.0005	<0.0005	<0.0005
1,2-Dichloroethane	LB2226064	mg/L	0.0005	<0.0005	<0.0005
1,1-Dichloroethene	LB2226064	mg/L	0.0005	<0.0005	<0.0005
2-butanone(MEK)	LB2226064	mg/L	0.020	<0.020	<0.020
Tetrachloroethene	LB2226064	mg/L	0.0005	<0.0005	<0.0005
Trichloroethene	LB2226064	mg/L	0.0005	<0.0005	<0.0005
Vinyl chloride	LB2226064	mg/L	0.0005	<0.0005	<0.0005
SVOCs Method: USEPA 8270E-2018					
2-Methylphenol	LB2226149	mg/L	0.0005	<0.0005	<0.0005
3&4-Methylphenol	LB2226149	mg/L	0.0005	<0.0005	<0.0005
2,4-Dinitrotoluene	LB2226149	mg/L	0.0005	<0.0005	<0.0005
Hexachlorobenzene	LB2226149	mg/L	0.0005	<0.0005	<0.0005
Hexachlorobutadiene	LB2226149	mg/L	0.0005	<0.0005	<0.0005
Hexachloroethane	LB2226149	mg/L	0.0005	<0.0005	<0.0005
Nitrobenzene	LB2226149	mg/L	0.0005	<0.0005	<0.0005
Pentachlorophenol	LB2226149	mg/L	0.0025	<0.0025	<0.0025

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Method Blank(MB)

Parameter	Batch ID	Unit	MDL	MB	Control Range
SVOCs Method: USEPA 8270E-2018 (continued)					
Pyridine	LB2226149	mg/L	0.002	<0.002	<0.002
2,4,5-Trichlorophenol	LB2226149	mg/L	0.0005	<0.0005	<0.0005
2,4,6-Trichlorophenol	LB2226149	mg/L	0.0005	<0.0005	<0.0005
SVOCs Method: USEPA 8270E-2018					
Endrin	LB2226150	mg/L	0.0005	<0.0005	<0.0005
γ-BHC	LB2226150	mg/L	0.0005	<0.0005	<0.0005
Toxaphene	LB2226150	mg/L	0.050	<0.050	<0.050
γ-Chlordane	LB2226150	mg/L	0.0005	<0.0005	<0.0005
α-Chlordane	LB2226150	mg/L	0.0005	<0.0005	<0.0005
Methoxychlor	LB2226150	mg/L	0.0005	<0.0005	<0.0005
Heptachlor	LB2226150	mg/L	0.0005	<0.0005	<0.0005

The evaluation of Method Blanks (MB): All results of MB on this batch are lower than method detection limits, which meet the acceptance criteria of lab quality control.

Laboratory Control Sample(LCS)

LCS Recovery%= Result*100/ Reference Value.

Parameter	Batch ID	Unit	MDL	Result	Ref. Value	Recevory%	Control Range Lower	Control Range Upper
Metals ICP-MS Method: USEPA 200.8-1994								
Arsenic (As)	LB2226116	mg/L	0.050	0.216	0.2	108	80%	120%
Barium (Ba)	LB2226116	mg/L	0.010	0.226	0.2	113	80%	120%
Cadmium (Cd)	LB2226116	mg/L	0.001	0.222	0.2	111	80%	120%
Chromium (Cr)	LB2226116	mg/L	0.010	0.213	0.2	107	80%	120%
Lead (Pb)	LB2226116	mg/L	0.010	0.210	0.2	105	80%	120%
Selenium (Se)	LB2226116	mg/L	0.050	0.228	0.2	114	80%	120%
Silver (Ag)	LB2226116	mg/L	0.010	0.224	0.2	112	80%	120%
Metals-Hg Method: USEPA 7473-2007								
Mercury (Hg)	LB2225315	mg/L	0.005	<0.005	0.001	104	80%	120%
Acid Herbicides in Water by GC-MS Method: USEPA 8151A-1996								
2,4-D	LB2226154	mg/L	0.0005	0.0008	0.001	75.0	70%	130%
2,4,5-TP (Silvex, Fenopop)	LB2226154	mg/L	0.0005	0.0007	0.001	74.0	70%	130%
VOCs Method: USEPA 8260D-2018								
Benzene	LB2226064	mg/L	0.0005	0.0185	0.02	92.4	70%	130%

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Laboratory Control Sample(LCS)

LCS Recovery%= Result*100/ Reference Value.

Parameter	Batch ID	Unit	MDL	Result	Ref. Value	Recevory%	Control Range Lower	Control Range Upper
VOCs Method: USEPA 8260D-2018 (continued)								
Carbon tetrachloride	LB2226064	mg/L	0.0005	0.0204	0.02	102	70%	130%
Chlorobenzene	LB2226064	mg/L	0.0005	0.0199	0.02	99.4	70%	130%
Chloroform	LB2226064	mg/L	0.0005	0.0191	0.02	95.6	70%	130%
1,4-Dichlorobenzene	LB2226064	mg/L	0.0005	0.0181	0.02	90.4	70%	130%
1,2-Dichloroethane	LB2226064	mg/L	0.0005	0.0170	0.02	85.0	70%	130%
1,1-Dichloroethene	LB2226064	mg/L	0.0005	0.0200	0.02	100	70%	130%
2-butanone(MEK)	LB2226064	mg/L	0.020	<0.02	0.02	73.8	70%	130%
Tetrachloroethene	LB2226064	mg/L	0.0005	0.0204	0.02	102	70%	130%
Trichloroethene	LB2226064	mg/L	0.0005	0.0189	0.02	94.5	70%	130%
Vinyl chloride	LB2226064	mg/L	0.0005	0.0210	0.02	105	70%	130%
SVOCs Method: USEPA 8270E-2018								
2-Methylphenol	LB2226149	mg/L	0.0005	0.0044	0.005	87.2	30%	144%
3&4-Methylphenol	LB2226149	mg/L	0.0005	0.0076	0.01	76.2	30%	141%
2,4-Dinitrotoluene	LB2226149	mg/L	0.0005	0.0045	0.005	89.2	46%	140%
Hexachlorobenzene	LB2226149	mg/L	0.0005	0.0044	0.005	87.8	61%	127%
Hexachlorobutadiene	LB2226149	mg/L	0.0005	0.0042	0.005	84.8	10%	111%
Hexachloroethane	LB2226149	mg/L	0.0005	0.0045	0.005	89.8	38%	131%
Nitrobenzene	LB2226149	mg/L	0.0005	0.0042	0.005	83.4	25%	133%
Pentachlorophenol	LB2226149	mg/L	0.0025	0.0135	0.025	54.0	35%	130%
Pyridine	LB2226149	mg/L	0.002	0.003	0.005	67.0	10%	200%
2,4,5-Trichlorophenol	LB2226149	mg/L	0.0005	0.0044	0.005	88.6	40%	140%
2,4,6-Trichlorophenol	LB2226149	mg/L	0.0005	0.0044	0.005	87.2	40%	140%

The evaluation of recoveries for Laboratory Control Samples (LCS): All recoveries of LCS on this batch are in the controlled range, which meet the acceptance criteria of lab quality control.

Laboratory Duplicate(DUP)

Relative deviation(RD)%=|Sample Result -Duplicate Result|*100/(Sample Result +Duplicate Result).

Parameter	Sample ID	Unit	MDL	Sample Result	Duplicate Result	RD%	RD Control Range%	Sur Control Range
Metals ICP-MS Method: USEPA 200.8-1994								
Arsenic (As)	SHE22-03443.001	mg/L	0.050	<0.05	<0.05	0.0	≤20	-
Barium (Ba)	SHE22-03443.001	mg/L	0.010	0.321	0.317	0.7	≤20	-

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Laboratory Duplicate(DUP)

Relative deviation(RD)%=|Sample Result -Duplicate Result|*100/(Sample Result +Duplicate Result).

Parameter	Sample ID	Unit	MDL	Sample Result	Duplicate Result	RD%	RD Control Range%	Sur Control Range
Metals ICP-MS Method: USEPA 200.8-1994 (continued)								
Cadmium (Cd)	SHE22-03443.001	mg/L	0.001	<0.001	<0.001	0.0	≤20	-
Chromium (Cr)	SHE22-03443.001	mg/L	0.010	<0.01	<0.01	0.0	≤20	-
Lead (Pb)	SHE22-03443.001	mg/L	0.010	16.0	14.8	3.8	≤20	-
Selenium (Se)	SHE22-03443.001	mg/L	0.050	<0.05	<0.05	0.0	≤20	-
Silver (Ag)	SHE22-03443.001	mg/L	0.010	<0.01	<0.01	0.0	≤20	-
Metals-Hg Method: USEPA 7473-2007								
Mercury (Hg)	SHE22-03443.001	mg/L	0.005	<0.005	<0.005	0.0	≤10	-
VOCs Method: USEPA 8260D-2018								
Benzene	SHE22-03541.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Carbon tetrachloride	SHE22-03541.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Chlorobenzene	SHE22-03541.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Chloroform	SHE22-03541.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
1,4-Dichlorobenzene	SHE22-03541.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
1,2-Dichloroethane	SHE22-03541.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
1,1-Dichloroethene	SHE22-03541.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
2-butanone(MEK)	SHE22-03541.001	mg/L	0.020	<0.02	<0.02	0.0	≤17.5	-
Tetrachloroethene	SHE22-03541.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Trichloroethene	SHE22-03541.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Vinyl chloride	SHE22-03541.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
SVOCs Method: USEPA 8270E-2018								
2-Methylphenol	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
3&4-Methylphenol	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
2,4-Dinitrotoluene	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Hexachlorobenzene	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Hexachlorobutadiene	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Hexachloroethane	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Nitrobenzene	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Pentachlorophenol	QCO22-01005.001	mg/L	0.0025	<0.0025	<0.0025	0.0	≤17.5	-
Pyridine	QCO22-01005.001	mg/L	0.002	<0.002	<0.002	0.0	≤17.5	-
2,4,5-Trichlorophenol	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
2,4,6-Trichlorophenol	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
SVOCs Method: USEPA 8270E-2018								
Endrin	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-

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Laboratory Duplicate(DUP)

Relative deviation(RD)%=|Sample Result -Duplicate Result|*100/(Sample Result +Duplicate Result).

Parameter	Sample ID	Unit	MDL	Sample Result	Duplicate Result	RD%	RD Control Range%	Sur Control Range
SVOCs Method: USEPA 8270E-2018 (continued)								
γ-BHC	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Toxaphene	QCO22-01005.001	mg/L	0.050	<0.05	<0.05	0.0	≤17.5	-
γ-Chlordane	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
α-Chlordane	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Methoxychlor	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Heptachlor	QCO22-01005.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-

The evaluation of Relative Deviation (RD) for Duplicates: All RD of duplicates on this batch are in the controlled range, which meet the acceptance criteria of lab quality control.

Matrix Spike(MS)

MS Recovery%= (MS Result-Sample Result) *100/Spike Added (Related factor should be taken into consideration) .

Parameter	Sample ID	Unit	MDL	Sample Result	MS Result	Spike Added	Recevory%	Control Range Lower	Control Range Upper
Metals ICP-MS Method: USEPA 200.8-1994									
Arsenic (As)	SHE22-03443.001	mg/L	0.050	<0.050	0.227	0.2	113	70%	130%
Barium (Ba)	SHE22-03443.001	mg/L	0.010	0.319	0.534	0.2	107	70%	130%
Cadmium (Cd)	SHE22-03443.001	mg/L	0.001	<0.001	0.188	0.2	94.2	70%	130%
Chromium (Cr)	SHE22-03443.001	mg/L	0.010	<0.010	0.197	0.2	96.5	70%	130%
Selenium (Se)	SHE22-03443.001	mg/L	0.050	<0.050	0.253	0.2	126	70%	130%
Silver (Ag)	SHE22-03443.001	mg/L	0.010	<0.010	0.186	0.2	93.1	70%	130%
VOCs Method: USEPA 8260D-2018									
Benzene	SHE22-03541.001	mg/L	0.0005	<0.0005	0.0188	0.02	93.8	50%	150%
Carbon tetrachloride	SHE22-03541.001	mg/L	0.0005	<0.0005	0.0219	0.02	110	50%	150%
Chlorobenzene	SHE22-03541.001	mg/L	0.0005	<0.0005	0.0206	0.02	103	50%	150%
Chloroform	SHE22-03541.001	mg/L	0.0005	<0.0005	0.0198	0.02	99.2	50%	150%
1,4-Dichlorobenzene	SHE22-03541.001	mg/L	0.0005	<0.0005	0.0184	0.02	91.8	50%	150%
1,2-Dichloroethane	SHE22-03541.001	mg/L	0.0005	<0.0005	0.0178	0.02	89.1	50%	150%
1,1-Dichloroethene	SHE22-03541.001	mg/L	0.0005	<0.0005	0.0197	0.02	98.6	50%	150%
2-butanone(MEK)	SHE22-03541.001	mg/L	0.020	<0.020	<0.02	0.02	74.0	50%	150%
Tetrachloroethene	SHE22-03541.001	mg/L	0.0005	<0.0005	0.0216	0.02	108	50%	150%
Trichloroethene	SHE22-03541.001	mg/L	0.0005	<0.0005	0.0191	0.02	95.6	50%	150%
Vinyl chloride	SHE22-03541.001	mg/L	0.0005	<0.0005	0.0186	0.02	92.9	50%	150%

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Matrix Spike Duplicate(MSD)

Relative deviation(RD)%=|MS Recovery% -MSD Recovery%|*100/(MS Recovery%+MSD Recovery%).

Parameter	Sample ID	Unit	MDL	MS Recovery%	MSD Recovery%	RD%	RD Control Range%	Sur Control Range
Metals ICP-MS Method: USEPA 200.8-1994								
Arsenic (As)	SHE22-03443.001	mg/L	0.050	113	110	NA	≤20	-
Barium (Ba)	SHE22-03443.001	mg/L	0.010	107	112	NA	≤20	-
Cadmium (Cd)	SHE22-03443.001	mg/L	0.001	94.2	94.3	NA	≤20	-
Chromium (Cr)	SHE22-03443.001	mg/L	0.010	96.5	95.8	NA	≤20	-
Selenium (Se)	SHE22-03443.001	mg/L	0.050	126	101	NA	≤20	-
Silver (Ag)	SHE22-03443.001	mg/L	0.010	93.1	93.7	NA	≤20	-
VOCs Method: USEPA 8260D-2018								
Benzene	SHE22-03541.001	mg/L	0.0005	93.8	92.8	0.5	≤17.5	-
Carbon tetrachloride	SHE22-03541.001	mg/L	0.0005	110	104	2.8	≤17.5	-
Chlorobenzene	SHE22-03541.001	mg/L	0.0005	103	104	0.7	≤17.5	-
Chloroform	SHE22-03541.001	mg/L	0.0005	99.2	97.3	1.0	≤17.5	-
1,4-Dichlorobenzene	SHE22-03541.001	mg/L	0.0005	91.8	92.0	0.1	≤17.5	-
1,2-Dichloroethane	SHE22-03541.001	mg/L	0.0005	89.1	84.4	2.7	≤17.5	-
1,1-Dichloroethene	SHE22-03541.001	mg/L	0.0005	98.6	98.9	0.1	≤17.5	-
2-butanone(MEK)	SHE22-03541.001	mg/L	0.020	74.0	72.6	0.9	≤17.5	-
Tetrachloroethene	SHE22-03541.001	mg/L	0.0005	108	106	0.9	≤17.5	-
Trichloroethene	SHE22-03541.001	mg/L	0.0005	95.6	92.8	1.5	≤17.5	-
Vinyl chloride	SHE22-03541.001	mg/L	0.0005	92.9	102	4.5	≤17.5	-

The evaluation of Matrix Spiked Duplicates (MSD): All recoveries for MSD on this batch are in the controlled range, which meet the acceptance criteria of lab quality control. All RD for MS and MSD on this batch are in the controlled range, which meet the acceptance criteria of lab quality control.

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*** End of Report ***

SGS-CSTC Standards Technical Services (Shanghai) Co.,Ltd.
Testing Center-Environment Laboratory

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VSUN
Innovative & Smart

VSUN-Louth-202301

STATEMENT

July 14th, 2023

To: Louth Callan Renewables LLC

Reference: Approval of TCLP test result

Dear Mr./Mrs.

We hereby declare that the result in the test report, report number - SHE22-03541 R0, is suitable for VSUN 550-144BMH-DG (Herein Purchase order refers to VVU2023023)

Name: CAI DENGRONG

Signature: Cai dengrong

Title: Technical Manager

CÔNG TY CỔ PHẦN VIETNAM SUNERGY

Vietnam Sunergy Joint Stock Company
Lot III-Dong Vang Area, Dinh Tram Industrial Zone,
Hoang Ninh Commune, Viet Yen District,
Bac Giang Province,
Vietnam

ATTACHMENT 3

Cost effective

- Modular architecture reduces BOS and maximizes system uptime
- Compact design and high power density maximize transportation and logistical efficiency

Maximum flexibility

- Scalable 1,500 VDC building block with best-in-class performance
- Flexible architecture creates scalability while maximizing land usage

Simple install, commissioning

- Ergonomic handling and simple connections enable quick installation
- Centralized commissioning and control with SMA Data Manager

Highly innovative

- SMA Smart Connected reduces O&M costs and simplifies field-service
- Powered by award winning ennexOS cross sector energy management platform

SUNNY HIGHPOWER PEAK3 125-US / 150-US

A superior modular solution for large-scale power plants

The PEAK3 1,500 VDC inverter offers high power density in a modular architecture that achieves a cost-optimized solution for large-scale PV integrators. With fast, simple installation and commissioning, the Sunny Highpower PEAK3 is accelerating the path to energization. SMA has also brought its field-proven Smart Connected technology to the PEAK3, which simplifies O&M and contributes to lower lifetime service costs. The PEAK3 power plant solution is powered by the ennexOS cross sector energy management platform, 2018 winner of the Intersolar smarter E AWARD.

Technical Data	Sunny Highpower PEAK3 125-US	Sunny Highpower PEAK3 150-US
Input (DC)		
Maximum array power	187500 Wp STC	225000 Wp STC
Maximum system voltage	1500 VDC	
Rated MPP voltage range	705 V ... 1450 V	880 V ... 1450 V
MPPT operating voltage range	684 V ... 1500 V	855 V ... 1500 V
MPP trackers	1	
Maximum operating input current	180 A	
Maximum input short-circuit current	325 A	
Output (AC)		
Nominal AC power	125000 W	150000 W
Maximum apparent power	125000 VA	150000 VA
Output phases / line connections	3 / 3-PE	
Nominal AC voltage	480 V	600 V
Compatible transformer winding configuration	Wye-grounded	
Maximum output current	151 A	
Rated grid frequency	60 Hz	
Grid frequency / range	50 Hz, 60 Hz / -6 Hz ... +6 Hz	
Power factor at rated power / adjustable displacement	1 / 0.0 leading ... 0.0 lagging	
Harmonics (THD)	<3%	
Efficiency		
CEC efficiency	98.5 %	99.0 %
Protection and safety features		
Ground fault monitoring: Riso / Differential current	● / ●	
DC reverse polarity protection	●	
AC short circuit protection	●	
Monitored surge protection (Type 2): DC / AC	● / ●	
Protection class / overvoltage category (as per UL 840)	I / IV	
General data		
Device dimensions (W / H / D)	770 / 830 / 444 mm (30.3 / 32.7 / 17.5 in.)	
Device weight	98 kg (216 lbs)	
Operating temperature range	-25°C ... +60°C (-13°F ... +140°F)	
Storage temperature range	-40°C ... +70°C (-40°F ... +158°F)	
Audible noise emission (full power @ 1m and 25°C)	< 69 dB(A)	
Internal consumption at night	< 5 W	
Topology	Transformerless	
Cooling concept	OptiCool (forced convection, variable speed fans)	
Enclosure protection rating	Type 4X (as per UL 50E)	
Maximum permissible relative humidity (non-condensing)	100%	
Additional information		
Mounting	Rack mount	
DC connection	Terminal lugs - up to 600 kcmil CU/AL	
AC connection	Screw terminals - up to 300 kcmil CU/AL	
LED indicators (Status/Fault/Communication)	●	
SMA Speedwire (Ethernet network interface)	● (2 x RJ45 ports)	
Data protocols: SMA Modbus / SunSpec Modbus	● / ●	
Integrated Plant Control / Q on Demand 24/7	● / ●	
Off-grid capable / SMA Hybrid Controller compatible	– / ●	
SMA Smart Connected (proactive monitoring and service)	●	
Certifications		
Certifications and approvals	UL 62109, UL 1998, CAN/CSA-C22.2 No.62109	
FCC compliance	FCC Part 15, Class A	
Grid interconnection standards	IEEE 1547, UL 1741 SA - CA Rule 21, HECO Rule 14H	
Advanced grid support capabilities	L/HFRT, L/HVRT, Volt-VAr, Volt-Watt, Frequency-Watt, Ramp Rate Control, Fixed Power Factor	
Warranty		
Standard	5 years	
Optional extensions	10 / 15 / 20 years	
Type designation	SHP 125-US-20	SHP 150-US-20

Technical data as of May 2020 ● Standard features ○ Optional features – Not available

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SMA America, LLC

ATTACHMENT 4

KEARSARGE ENERGY

2023 OPERATIONS AND MAINTENANCE MANUAL

HADDAM QUARTER ROAD SOLAR FACILITY

Operations and Maintenance Manual

Contents

INTRODUCTION

This manual describes the operation and maintenance of the Haddam Quarter Road Solar 3.022 MW DC photovoltaic (PV) facility located on Haddam Quarter Road in Durham CT.

The array has been designed as follows. Please note that the site "as built" may vary from the initial design below.

Equipment	Model
Modules (solar panels)	VSUN, VSUN550-144BMH-DG550W panels or equivalent
Transformers	Eaton, Cooper or equivalent
Solar Inverters	SMA Sunny Highpower PEAK3 150-US or equivalent
Racking	APA Solar Racking Systems

The solar PV facility is comprised of PV modules, associated wiring components, and string inverters. In operation, the DC power produced by the solar sub-array is converted to three-phase AC power by the inverters. That power is then supplied into an electrical main utility panelboard, which effectively enables each sub-array to function independently. The sub-arrays are then collectively interconnected to the utility system through a series of step-up transformers.

In the event of a power failure, the facility will automatically shut down when a loss of AC power occurs per UL 1741 and IEEE 1547 to protect utility personnel from injury while repairing the utility system.

This manual provides a description of the facility, procedures for basic operations, maintenance and troubleshooting of the system and important safety information.

RESPONSIBLE PARTIES

Land Owner:

Newton Family Trust
Attn: Charlie Newton
Tel: 860-614-4087
Email: charnew1021@gmail.com

Site Operator (Lessee):

Kearsarge Haddam Quarter LLC
1380 Soldiers Field Road, Suite 3900
Boston, MA 02135
Tel: 617-393-4222
Email: Abernstein@kearsargeenergy.com

A Ground Lease Agreement is being executed between the Landowner (Lessor) and Kearsarge Haddam Quarter LLC (Lessee/Site Operator).

Kearsarge Haddam Quarter LLC is the Operator of the Solar Project at the Site, and is the responsible party for the following Solar operations and maintenance activities on the Site:

- Grounds maintenance and maintenance of vegetation within the limits of the leased area, which shall include all solar generation equipment and a buffer surrounding such equipment, to be determined based on topography and site conditions.
- Drainage swales and stormwater controls (if any) within the limits of the leased area
- Access ways within the leased area

USE OF THIS DOCUMENT

This document packet is provided for informational purposes only. No one but the Operator and its Agents should attempt to operate any equipment on site.

This document is not intended to provide comprehensive site safety instructions, nor detailed operational guidance.

SITE SAFETY INFORMATION

FOR SITE EMERGENCIES

- For any life or property-threatening emergencies, **please dial 911**
- To report site issues, or speak to a Kearsarge representative please dial toll-free **855 277 6257**
- Kearsarge Haddam Quarter LLC welcomes the opportunity to train Town safety officials and operations staff on emergency procedures concerning the installation and operation of the solar system. Shortly after system start up and commissioning and in coordination with Town personnel, Kearsarge Haddam Quarter LLC can provide on-site training to applicable personnel on emergency operations and maintenance of the system and in all aspects concerning safety precautions, considering the high voltages and currents within the array structure and power equipment. Kearsarge Haddam Quarter LLC can also provide a short training course on the web-based Data Acquisition System for data monitoring.

EMERGENCY PV SHUTDOWN PROCEDURE

The following steps are required to shut the system down in an emergency:

1 Turn the AC Disconnect Switch to the "OFF" position.

2 Turn the DC Disconnect Switch to the "OFF" position.

These steps will power off the inverters; however, AC power from the grid and DC power from the array will still be present in the inverter wire termination section.

The next steps will disconnect power from the array and the utility transformer to the inverters:

1 Open DC PV array disconnect switches located on the inverter pad.

2 Open the main overhead disconnect switch. Or disconnect the individual inverter circuit breakers located inside the switchboards within the site.

Please refer to the as-built drawings or prominently displayed signage for switch location.

IMPORTANT NOTES:

WHILE THE ABOVE STEPS ISOLATE THE PV ARRAY CIRCUITS FROM THE INVERTERS, ALL CIRCUITS BETWEEN THE PV MODULES AND THE DISCONNECT SWITCHES WILL BE ENERGIZED DURING DAYLIGHT HOURS. HIGH VOLTAGE WILL BE PRESENT EVEN AT LOW LEVELS OF SUNLIGHT.

IT IS IMPERATIVE TO FOLLOW SAFE WORK PRACTICES AND USE PROPER SAFETY EQUIPMENT DURING ANY EMERGENCY OPERATIONS, WHICH INVOLVE ANY PORTION OF THE PV ARRAY.

GENERAL PV SAFETY PRECAUTIONS

The system has been designed for safe and reliable operation. However, it is critically important that any personnel who operate or maintain the system observe the proper safety precautions. Listed below are some of the most critical safety considerations:

1 ONLY LICENSED, QUALIFIED, EXPERIENCED AND TRAINED PERSONNEL SHOULD PERFORM REPAIR WORK ON ANY ELECTRICAL COMPONENTS OF THE SYSTEMS.

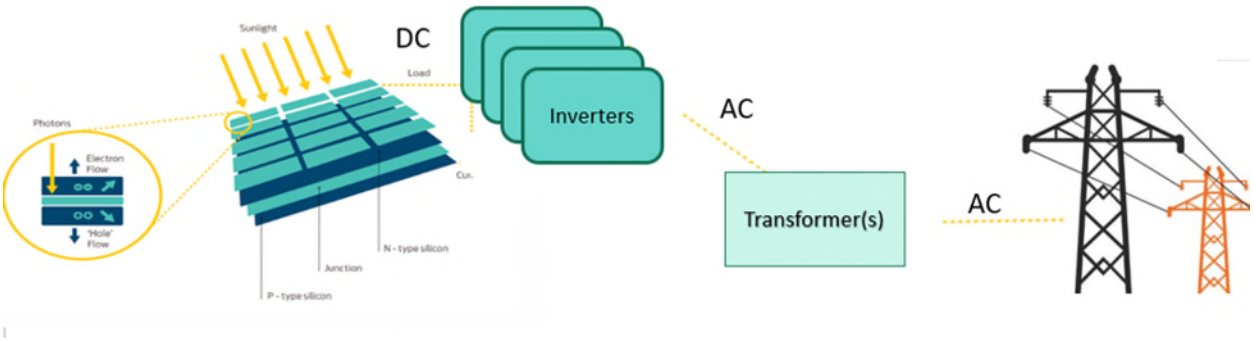
2 DANGEROUS VOLTAGE LEVELS ARE PRESENT IN EACH SYSTEM – VOLTAGES UP TO 1,000 VOLTS DIRECT CURRENT (DC) AND 13,200 VOLTS AC CAN BE FOUND UNDER PARTICULAR OPERATING CONDITIONS. IT SHOULD BE NOTED THAT HIGH VOLTAGE SYSTEMS REQUIRE SPECIAL SAFETY PRECAUTIONS DURING MAINTENANCE OR REPAIR OPERATIONS.

3 PV MODULES PRODUCE VOLTAGE WHENEVER THEY ARE EXPOSED TO SUNLIGHT. AT ANY TIME DURING DAYLIGHT HOURS, (INCLUDING MINIMAL SUNLIGHT CONDITIONS) THERE IS AN ELECTRICAL SHOCK HAZARD IF ANY PERSONNEL SHOULD CONTACT EXPOSED PV ARRAY ELECTRICAL CIRCUIT COMPONENTS.

4 BROKEN OR CRACKED PV MODULE GLASS CAN INCREASE RISK OF SHOCK HAZARD, ESPECIALLY WHEN WET. IMMEDIATELY CONTACT QUALIFIED PERSONNEL FOR REPLACEMENT SERVICES IF ANY BROKEN PV MODULE GLASS IS NOTICED.

SYSTEM DESCRIPTION

Solar sites are remarkably simple, consisting of a handful of major equipment types.



PV ARRAY

The ground-mounted photovoltaic arrays consist of PV modules which convert sunlight directly into electricity for utilization by a load such as a utility interconnected inverter. Each module is a sealed, solid-state device with an expected performance life well in excess of 25 years.

Electrically, the PV modules are wired into groups, which are referred to as strings or source circuits. Each source circuit is comprised of individual PV modules wired in a series configuration. Individual source circuits are then grouped together in combiner boxes forming sub-arrays.

For the PV modules to produce their full electrical output, they must be clean and free of shade. Shadows cast by nearby objects such as antennas, air conditioning equipment, trees, overhead wires, etc. will significantly reduce a module's current and voltage output. Because each module is electrically interconnected with other modules, reducing the output of a single module effectively reduces the energy production for the entire source circuit.

The solar modules are mounted using a rack mounting system, with a steel frame to secure the solar array at a uniform tilt angle to minimize shading, while optimizing use of array area.

INVERTERS

The inverters act as a fully automatic power-conditioning interface between the PV array and the utility system. The inverter will utilize solid-state power and control components to maximize power production from the PV array while meeting power quality and safety standards set forth by utilities under Underwriters Laboratories Safety Standards.

An LED display associated with the Ground Fault Detection and Interrupt Circuit (GFDI) on the face of the inverter will indicate the operating status of the unit along with other pertinent data. Please refer to the Inverter O&M manual for more details on the design and operation of the inverter.

To operate efficiently, the inverter circuit components must be kept free of excessive dust and dirt. In addition, the cooling fans and the blower impellers must be kept clean for efficient air movement. Dirt accumulating on circuit boards and electrical equipment leads to higher component operating temperatures and shorter life.

TRANSFORMERS AND ELECTRICAL SYSTEM

Transformers regulate and condition power prior to injection to the grid, and they are often custom-made to meet the specialized electrical requirements of both the array and the grid.

The system electrical circuitry transfers electrical energy from the PV arrays to the inverters and then from the inverters to the transformer and finally, to the point of utility interconnection. The components utilized in the system design are standard electrical components and can be serviced by any qualified electrical contractor who is thoroughly familiar with photovoltaic power systems.

DATA ACQUISITION SYSTEM

This Photovoltaic power system is equipped with a Data Acquisition System (DAS) manufactured by Also Energy (The global leader in Energy DAS) to monitor the energy production of the system.

The DAS consists of an environmental weather monitoring system, and various energy measurement components, which are both connected to an Internet Broadcast Device. The central DAS components and environmental components are located together within the site.

An environmental instrument package measures solar insolation, wind speed, and ambient temperature while the energy monitoring system measures power and the electrical energy produced by the system.

Information gathered by the DAS is broadcast to a web site for processing and monitoring purposes. This service not only gathers energy production data, but also issues alerts to system administrators when the system's projected performance falls below expected values.

In some cases the DAS can be configured to allow remote site diagnostics and operational control. Please contact the Site Operator for additional information.

SYSTEM COMPONENT SAFETY

PV ARRAYS– REPAIR BY SITE OPERATOR ONLY

PV Array

The solid-state nature of the PV array greatly reduces the amount of maintenance required when compared to traditional mechanical generating systems. Unless a portion of the PV array becomes physically damaged, the system will be safe and reliable for its service life. In the event that repair or maintenance work must be undertaken, please be aware of the following precautions:

- Only qualified personnel should be allowed access to the internal or energized components of the PV array junction boxes, inverters, panelboards, transformers, disconnect switches or field wiring.
- The PV array will always be electrically energized during all daylight conditions; so proper training, experience and precautions are required to ensure personnel safety.
- Before attempting any maintenance or washing operations, carefully inspect the entire PV array for modules with broken glass. A qualified contractor must replace broken PV Modules before any array washing or other maintenance work is attempted.
- In order to disconnect the entire PV array from the inverters, secure the operating handles of all mounted PV Array disconnect switches in the "Off'' position.
- To disconnect a single PV array source circuit from the inverter, secure the operating handle of its associated PV Array disconnect switch in the "Off'' position.
- Verify that all components undergoing maintenance or repair are disconnected from the inverter before servicing.
- Do not remove any fuses, or disconnect any PV module wiring while the array is electrically connected to the inverter.
- Physical damage to components and hazardous conditions will result if any individual PV Array component is opened under load.
- Do not attempt to access the junction boxes on the back of the PV modules. There are no user serviceable components in the module junction boxes.
- Always follow safe work practices and use proper safety equipment during maintenance or repair operations on the PV array.

INVERTERS – REPAIR BY SITE OPERATOR ONLY

When compared to historical rotary inverter technology, the solid-state design utilized in the Inverters greatly reduces maintenance requirements while maximizing system-operating efficiency. Before

undertaking any routine maintenance or repair work, please read the Inverter manual and pay close attention to the following precautions:

- To shut down an inverter, turn the AC and DC Disconnect Switches, on the front of the inverter, to the "OFF" position. These switches can be used to shut down an inverter whenever there is a question regarding personal safety or the operation of either inverter.
- The appropriate AC breaker in the main panelboard for the respective inverter must be secured in the "OFF" position in order to ensure that the inverter is not energized by utility during routine maintenance operations.
- Only qualified, experienced and trained personnel should perform repairs on the electronic and electrically energized components inside the inverters.
- Because the interior of the inverter cabinet contains exposed high voltage components, the cabinet door should remain closed at all times. Qualified, maintenance or repair personnel should only open the cabinet to perform maintenance or service work after the inverter has been completely disconnected from all electrical energy sources and the capacitors have fully discharged.
- To reduce the risk of electric shock, do not perform any maintenance work other than that specified in the Inverter manual.
- Only SMA factory personnel or their designated agents should perform any service work on the inverter's power conditioning or control components.
- Do not open the inverter cabinet doors during wet or inclement weather conditions. Introducing rain or moisture into the cabinet interior could result in hazardous conditions or damage to electrical components. For further information on the inverter, please refer to the appropriate inverter manual.
- Be sure to follow safe work practices and use proper safety equipment during maintenance or repair operations on the inverters.

SYSTEM OPERATION – REPAIR BY SITE OPERATOR ONLY

During normal operation, the inverters will act as fully automatic power-conditioning devices. The inverter will start to process power whenever there is sufficient energy available from the PV array. During the generation process, the inverter will utilize peak power tracking technology to maximize the energy production from the array. This function is achieved by varying the peak voltage and current point on the power curve for the photovoltaic array as operating conditions vary throughout the day.

Under basic operation, the PV array generates direct current (DC) and supplies it to the inverter. The inverter processes and conditions the direct current obtained from the PV array into 600 volt three-phase alternating current (AC), which is then stepped up to 13,200 volts via the transformers to the utility voltage at the site. In addition, the inverter synchronizes the phase characteristics and frequency to match that of the utility system.

In the event that the quality of the utility power momentarily falls outside a set of pre-specified parameters, the inverter will automatically shut down in a fault mode. After stable utility power becomes available again, the inverters will automatically restart and continue to process power. In the total absence of utility power, the inverter will not operate.

Whenever the PV array produces insufficient energy to efficiently operate the inverter, the inverter will automatically go into a low power "sleep" mode. The inverter will then sample the PV array for available power and resume power processing functions when sufficient levels of electrical energy are once again available from the array.

The inverter will also shut down whenever an operating problem is detected with the PV array, utility power quality or an internal operating parameter. Under such conditions, a fault code will be displayed on the front user interface panel. The fault code can then be matched to a detailed list of fault codes found in the Inverter O&M manual.

ACTIVATING OR STARTING THE SYSTEM – BY SITE OPERATOR ONLY

Before attempting to operate the inverters, refer to the Inverter O&M manual for initial turn-on procedures. The O&M manual also contains a detailed list of inverter fault codes, safety procedures, and other pertinent information.

The following describes normal steps taken to turn the inverter on or off. Refer to the as-built drawings for identification of components.

The start-up operations listed below should be followed in the sequence listed (for each inverter):

1 Remove any lockout devices on the disconnect switches after confirming that any repairs or maintenance operations have been completed and that no personnel are still working on the system.

2 Make sure that the inverter cabinet doors and DC disconnect doors are all closed and locked.

3 Turn on the dedicated 3-phase (dedicated) circuit breaker on the electrical panel.

4 Verify the proper clockwise phase sequence at the "line" side terminals (top) of the AC disconnect. Do not turn on until clockwise phase sequence has been verified.

5 Turn on the Inverter's 3-phase AC disconnect.

6 Turn on the Inverter's DC disconnect.

7 Watch the LED indicators for initialization (green and red LEDs on), then slow blinking green LED followed by faster blinking green LED. Watch the LCD display for prompts and system status.

8 Listen for contactor clunk (inverter on-line).

9 Listen for slight 60Hz hum (transformer on-line).

10 Following the blinking green LED and high frequency switching sound you should see a solid green LED (inverter on-line and beginning to feed power into 3-phase circuit). This confirms that the inverter is operating normally. The LCD display will show the AC Power, Energy, current and voltage as well as DC voltage.

11 If the unit fails to power on, use the troubleshooting information provided in the user manual. If those steps do not resolve the problem, contact the Site Operator or Inverter Manufacturer.

MAINTENANCE

STORMWATER AND VEGETATIVE MAINTENANCE

We will comply with all state and local orders and conditions pertaining to stormwater management and site feature inspection. We use generally accepted maintenance standards for solar arrays, typically focused on guaranteeing insolation and the health of any landscaped plantings or features.

MAINTENANCE PRECAUTIONS

The Site Operator and its highly trained Agents are the only parties who should undertake any maintenance or repair to the system. Before doing so, Site Operator staff will follow the shutdown procedure described in the previous sections.

1 Review and understand all safety precautions and maintenance operations described in both this document and the Inverter Manual.

2 Only qualified individuals should perform or supervise any maintenance procedures.

3 Install appropriate lock out devices on all system disconnecting means to protect personnel performing maintenance operations on the system from electrical shock hazards.

4 Do not open the inverter cabinet door for any reason, only SMA personnel are permitted to perform maintenance or inspections.

5 Contact Site Operator if there are any questions regarding operation or maintenance procedure for the PV array.

Note: The PV array circuits, array combiner boxes, the array disconnect switches and all associated wiring will remain energized as long as there is sunlight. Hazardous DC voltage levels will be present in all these components even during very low daylight conditions.

DAILY AND PERIODIC REMOTE OPERATIONS AND MONITORING

The Operator's Asset Management staff have the ability to monitor site equipment remotely, performing a suite of daily operational checks to verify site status and performance. In some cases, real time remote diagnostics allow O&M staff to analyze and correct common equipment issues through the same on-line interface. Comprehensive remote diagnostics and operations are fairly new to solar, and have allowed Operators to perform deeper analysis and understand fairly subtle performance issues without visiting the site.

On site cameras allow Asset Management staff to get a real time and historical view of site conditions, to assess vegetation, soiling, weather, and major equipment housings.

Web based performance monitoring mini sites can be provided to municipalities interested in following solar performance in real time.

PV Array Monitoring Procedures

Description	Action
1. Daily and intraday review of site alerts and equipment notifications	**Daily: Coordinate O&M team site visits as necessary, and insure that issues are corrected expeditiously**
2. Review site video camera as necessary to establish real-time site conditions	**Daily: Review**
3. Verify inverter and meter performance to expected	**Daily: Coordinate investigation of any unexplained variance to expected**
4. Verify total site output to expected	**Daily: Coordinate investigation of any variance to expected**
5. Periodically analyze string, combiner, and inverter performance on a comparative basis, site-wide to identify underperformance related to blown fuses and other subtle performance issues	**Periodically: Coordinate investigation of any variance to expected**

Kearsarge Montague, Winter 2019, from the on-site camera

PROCEDURES FOR ALL SITE VISITS

Remote monitoring and diagnostics do not displace on-site maintenance. From time to time Operations and Maintenance staff will be on site to investigate and correct issues. These visits are irregular but represent an opportunity to conduct a routine inspection and validate site conditions as thoroughly as possible. On average, Operations and Maintenance staff visit sites monthly to attend to on-site maintenance issues. For sites hosting grazing stock visits are at least biweekly.

PV Procedures at all Site Visits

Description	Action
1. Validate integrity of fencing	Coordinate O&M team site visits as necessary, and assure that issues are corrected expeditiously
2. Evaluate general condition of vegetation, shading	Recommend maintenance
3. Verify the integrity of major drainage features/erosion/settling	Recommend maintenance/additional evaluation
4. Verify the integrity and check soil levels of visible panels	Recommend maintenance
5. Note obvious wire maintenance issues, if any	Recommend maintenance
6. Perform equipment-specific or site-specific checks as necessary, on both the PV array and the DSS	As required

ANNUAL MAINTENANCE PROCEDURES FOR THE PV ARRAY

At least once annually (more often if conditions warrant) Operations and Maintenance staff will conduct a thorough walk-through of the site, to perform preventative maintenance and diagnostics on all major equipment. This generally takes place in Spring.

Thermal imaging of major equipment, including a sample of panels, is conducted annually in addition to the below visual inspection. This data is collected and analyzed to uncover issues prior to equipment failure and/or degraded performance. Some array components may require more frequent cleaning depending on age and model; the elements below represent minimum annual activity.

Site inspection and video photography via drone is also performed on an annual or bi-annual basis.

Annual Maintenance Procedures

Components & Equipment	Description	Action
PV Modules	Check for dust & debris on module surface	Wash or wipe clean with water
	Check for physical damage on all PV modules	Replace damaged PV modules
	Check for loose or disconnected cable terminations between PV module wiring	Retighten or reconnect wiring
	Check cable condition	Replace worn cables if necessary
	Check for shading obstructions on all PV modules	Identify source and remove
	Check for fading/discoloration, burn marks, seal condition, frame damage or rust	Log and report conditions to Site Operator
PVInverters	Check functionality – e.g. auto disconnect upon loss of grid power supply, error & ground fault LED indicators	Consult inverter manufacturer for repair or replacement parts
	Check ventilation condition	Clear dirt, dust or debris from ventilation system
	Check for abnormal operating temperature	Consult inverter manufacturer for repair or replacement parts
	Check for abnormal noises – i.e. irregular humming or rattling	Consult inverter manufacturer for repair
	Inspect inverter structure(s) and enclosure(s) (seals, rust, damage, door condition, switch/handle condition, locks)	Log and report conditions to Site Operator
Cables	Check for cable conditions – i.e. wear and tear	Replace worn cables if necessary
	Check cable terminals for burnt marks, hot spots or loose connections	Tighten connections or replace if necessary
Combiner Boxes	Check cable terminals – e.g. wear and tear, loose connections or burn marks	Tighten or replace if necessary
	Check for placards and signage	Replace if necessary
	Check for physical damage	Replace if necessary
	Check for blown fuses inside the Combiner Box	Replace blown fuses
	Check for water leaks inside the Combiner Box	Replace combiner box or repair to prevent future water leaks
Bonding & Grounding	Check grounding cable and bonding connection conditions	Replace worn cables if necessary
	Check the physical grounding/bonding connection	Retighten connection if necessary
	Check continuity of grounding and bonding conductors	Troubleshoot or replace if necessary
Disconnect Switches	Check functionality	Replace or repair as necessary
PV Module Racking System	Check for corrosion	Treat corroded areas or consult racking manufacturer/installer
	Check for damage to racking system	Replace or repair damaged parts
	Check for settlement	If settlement is detected within the solar array area it will be assessed in conjunction with the Owner, as applicable, and an

Components & Equipment	Description	Action
		appropriate response action will be selected
Pole Mounted Equipment	Check for damage or irregularities – e.g. damage from weather related incidents, blown fuses, lightning marks, etc.	Replace or repair damaged equipment
Transformers	Operator will be responsible for attending the site to check the terminations, etc. for the main transformer Any alarms raised by the public or the DAS should be immediately forwarded directly to Site Operator for action Check fluid levels	Log and report conditions to Site Operator
General/ Vegetation	Check vegetation control to maintain optimal performance of PV system Check fence/gate security Check internal access-ways/signage integrity Check for erosion Check for settlement	Mowing of grassy areas as necessary to maintain solar generation efficiency. Pruning of trees/bushes on property, or overhanging property that cause shading of the PV panels or potential damage to fencing/equipment in compliance with any conditions of the land lease Site Operator to carry out repair/replacement of fence and security systems as appropriate, as well as general erosion control.

SITE ACCESS

Sites are locked via metal chain threaded through the site gate, secured with a combination or key lock. In an emergency, bolt cutters can be used to gain access to the site. The site combination is changed from time to time.

Towns may prefer to have “daisy chain” or Knox Box access, where multi user access is preferred.

In a daisy chain scenario, the entrant need only know one of the combinations in order to gain access. Knox boxes, example pictured below, offer master key access to the site key.

LOCK-INS

Anyone operating in and around the solar site needs to be cognizant of lock-ins, and the danger they pose.

When maintenance staff enter the site they will leave the gate unlocked in the unlikely event that first responders and emergency vehicles need to respond to an accident quickly. For this reason, the site should not be locked if it appears to be unlocked.

Please contact Asset Management at Kearsarge Energy at our toll-free number: **855 277 6257** before locking a gate that appears to have been left open. Kearsarge will verify that O&M staff are not inside before the gate should be secured.

Kearsarge will promptly investigate why the gate was left unlocked.

SITE SIGNAGE

Signage can include markings on particular pieces of equipment, exterior gates, or surrounding fences; NFPA/NEC rules dictate what markings are required on particular pieces of equipment: https://www.nfpa.org/

Kearsarge tailors exterior signage to the preferences and needs of local authorities.

Generally, Kearsarge requires OSHA-compliant exterior signage that:

- Firmly discourages trespassing
- Advises “who to call” to report an emergency or issue
- Lets first responders know where critical site shutoff facilities are
- Provides QR code that links to an application that tracks site entry and exit

Finally, signage, unlike many other site features, is flexible; if preferences change, Kearsarge will work with stakeholders to accommodate reasonable requests.

During construction, the contractor may be listed as primary contact

Typical Exterior Signage

Site disconnect map, telling emergency personnel how to shut down the site

General Trespassing and safety warning

Typical Transformer Signage/ NFPA

Typical Inverter Signage /NFPA

Check in and Check Out Policy

All site visitors are required to check in and check out via an on line application that tracks site entry and exit, and collects basic personal and site condition information.

COMMON MAINTENANCE PROCEDURES

The following section outlines basic maintenance procedures, for the reader's information. No procedure should be attempted by anyone but the Operator or its Agents.

PV MODULE REPLACEMENT PROCEDURE

WARNING: ONLY QUALIFIED PERSONNEL SHOULD WORK ON THIS SYSTEM. PHOTOVOLTAIC MODULES ARE ALWAYS ENERGIZED WHEN EXPOSED TO LIGHT.

Perform module replacement operations in the order described below:

- Refer to the string wiring diagram to locate which inverter and DC disconnect the module is associated with.
- Put in the OFF position and lock out all PV Array Disconnect (inverter DC disconnect and panelboard AC disconnect) switches associated with the inverter prior to starting replacement operation.
- Open all circuit fuses that the module is associated with.
- WARNING: Do not open fuses until the DC disconnects have been turned off. Pulling fuses under load is an unsafe practice and a fire hazard, doing so could cause damage to PV wire, fuse holder, and combiner box.
- Cover the module with a blank out mat with steel spring clamp.
- Use PV disconnect tool to disconnect positive and negative leads of the broken module.
- WARNING: Do not disconnect modules until the fuses have been pulled. Disconnecting modules under load is an unsafe practice and a fire hazard, doing so could cause damage to PV module, connector, and wire.
- Loosen the four 5/16" bolts that attach PV module to racking.
- Replace broken module with new module.
- Replace the four 5/16" bolts and torque to 12 ft-lbs.
- Check module leads for any damage, and then connect positive and negative leads.

- Replace tie wraps for wire management.
- Close all fuses that the module is associated with.

INVERTER IS NOT OPERATING

In the event that the inverter is not running as expected during daylight hours with a clear sky and strong sunlight, please check the following:

1 Contact the Site Operator.

2 Verify that the facility is receiving power from the utility connection and that an electrical outage has not occurred within the last 10 minutes.

3 Make sure that the inverter doors are all closed and locked.

If the inverter does not begin countdown to operation after a 300 second delay once step three is complete, look for lockout devices on the disconnect switches listed below.

Important Note: The switches listed below may also be found unlocked in the "OFF" position for a specific reason. Do not close any switches without first verifying that no personnel or property are at risk if the switch is closed.

1 Utility AC Disconnect.

2 Inverter AC Disconnect.

3 Array Disconnects.

After establishing that it is safe to do so, close the switches in the following sequence:

1 Close the DC Disconnect switches.

2 Close the main disconnect switch and close the individual inverter specific breakers in the panelboard cabinets.

3 Close the DC PV array disconnect switches located on the panelboard pad.

If the inverter still does not operate after completing the sequence described above, then a Fault condition likely exists. Please refer to the following section for recommendations on further actions.

INVERTER IS IN FAULT MODE

The inverters have a set of internally monitored operating conditions that must be met for safe and reliable operation. If any of these conditions is not met, the inverter shuts down and goes into what is known as a "Fault" mode. The inverter will remain in off in the Fault mode until the condition is corrected.

Many operating conditions may change temporarily during normal system operation. Temporary fault conditions such as momentary sags in utility line frequency or voltages are transient, so the inverter will automatically restart after the operating conditions return to normal.

If the fault condition is not temporary the inverter will remain out of operation until the fault condition is corrected. In the event that an inverter has been off for several hours with uninterrupted electric utility service and clear sunny skies, then a more prevalent type of fault condition is likely preventing the inverter from operating.

To identify the fault condition, please refer to the Inverter Installation and Operation manual for a description of how identify fault codes and how to do a soft restart as well as a hard restart of the inverter. The menu will indicate the present fault condition, which should recorded, be reported to facility operations manager for evaluation and correction.

LOW ENERGY PRODUCTION REPORTED BY THE DAS

Some common causes of system underperformance are:

- Heavy dirt, debris, dust accumulation, or shading on the PV array.
- Damaged PV modules.
- Compromised electrical system components such as damaged conduit or wiring.
- Open fuses in the PV array combiner boxes or open disconnect switches.

FAQ's

Common site issues

The Operator should be contacted immediately if abnormalities are discovered on or around the site. The most common issues are weather-related, with storm damage from trees the most common problem.

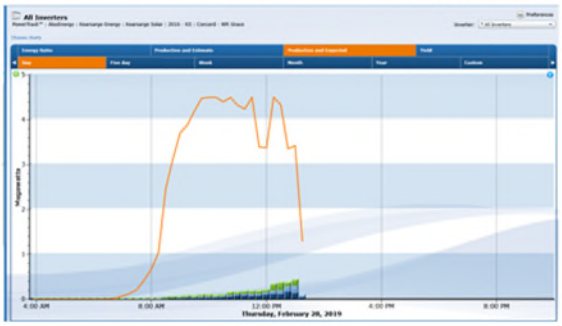
Contact us toll free at 855 277 6257.

- Trees down
- Fencing compromised
- Broken panels
- Issues with mowing or site maintenance
- Gate appears to be unlocked
- Erosion or animal burrowing on site

How are sites managed?

- Cameras allow remote staff to see the site for security purposes, as well as to confirm snow and other debris.
- Kearsarge monitors individual pieces of equipment to benchmark performance over time; in addition, some site functions are remotely controlled.
- Weather equipment tracks how strong the sun is at minute intervals; other tools track electrical generation down to the inverter and string level.

Concord - WR Grace



How do seasons and weather affect solar production?

Concord - WR Grace

- Snow covered panels don't operate well. Snow typically slides off quickly
- Although snow and ice reduce productivity in the short term, they provide a valuable "scouring" effect that removes grime and dust
- High ambient temperatures reduce solar production; hot August days are less productive than cool May days, even with the same amount of sun
- Solar produces twice as much in June as in January due to the length of the day and the angle of the sun
- When the utility loses power, (counterintuitively), solar arrays stop producing as a safety measure; when the utility is down, so are we.

Appendix A – Emergency Response

DRAFT EMERGENCY RESPONSE PLAN

Kearsarge Haddam Quarter Solar Project

Kearsarge Haddam Quarter LLC

Haddam Quarter Road, Durham, CT

In the case of an emergency, responders will access the array from the Johnson Lane entrance where there is a gated access point. One Knox box will be installed at the entrance gate to the solar array during construction to provide the Fire Department with access to the site. Electrical equipment and disconnects are located at the entry point to the solar array. Responders can readily access the electrical equipment. The location of the electrical equipment will be clearly marked on signage at the gates and the disconnect switches will be clearly labeled.

A numbering system will identify individual rows of the PV panels to assist emergency responders with finding a specific location in the event of an emergency. The row labeling will be finalized during the construction phase of the project. As-Built drawings depicting the row labeling will be provided to the Fire Department.

This emergency response plan will be filed with local emergency responders and updated as necessary. Emergency response information may also be posted on the access gates. Contact information is included below.

EMERGENCY CONTACT DETAILS

24-hour Emergency Contact:

Kearsarge Haddam Quarter LLC
Patricia Fennessey
Director of Asset Management
617-393-4222 / 855 277 6257
pfennessey@kearsargeenergy.com
1380 Soldiers Field Road, Suite 3900
Boston, MA 02135

Landowner Contact:

Newton Family Trust
Charlie Newton
Tel: 860-614-4087
Email: charnew1021@gmail.com

Town of Durham Police Department: In an emergency dial 9-1-1

Town of Durham Police Dept.
24 Town House Road
Durham, CT 06422
Tel: 860 399-2100

Town of Durham Fire Department: In an emergency dial 9-1-1

Town of Durham Fire Department
41 Main Street
Durham, CT 06422
Tel: 860 349-9112

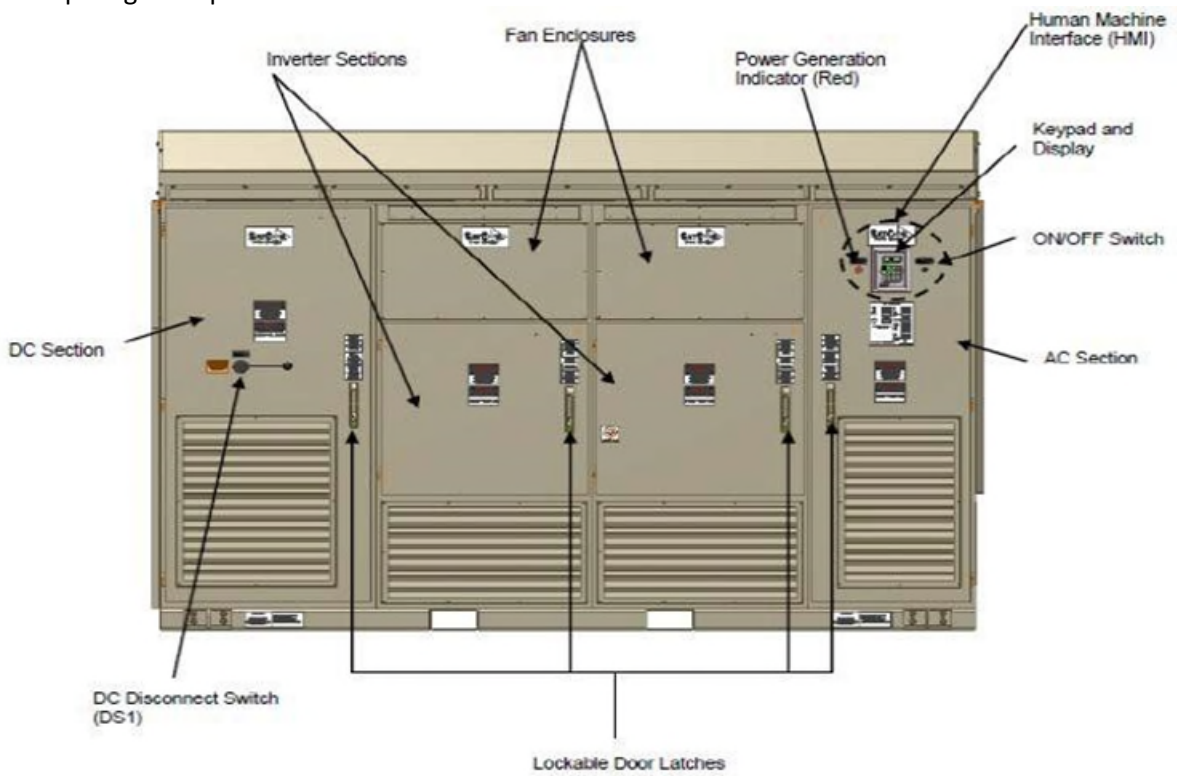
EMERGENCY SHUTDOWN PROCEDURE

In an emergency the ON/OFF switch on each inverter should be manually turned to the OFF position. This will internally shut off both the AC and DC switches inside the inverter. After the system has been turned off the DC Disconnect Switch labeled DS 1 should be turned off and a lock should be placed on it to keep it from being reenergized.

Now that the system is off, follow normal shut down procedures below to turn off remaining closed switches.

Note – Disconnecting the AC and DC switches will stop current flow and isolate the solar system from the utility distribution system, however DC wiring from the panels to the inverters remains potentially energized and hazardous.

A sample figure is provided below.



Simple System Shutdown and Startup Procedures

Any work done on the solar electric system must be approved in writing by Kearsarge Haddam Quarter LLC and performed by an authorized electrician. To work on the DC side of the solar system when the system is running properly or to reset the inverter, use the following steps to shut down and restart the system.

Inverter Shutdown

Use the following procedures for system shutdown.

- Turn off the ON/OFF switch on the inverter/panelboards
- Turn the DC disconnect off
- Turn the AC disconnect off
- Install lockout devices on the disconnects
- Turn off DC-Fused Combiner Box switches

Inverter Start / Restart

Use the following procedures for system start-up and restart:

- Turn on DC-Fused Combiner Box switches after verifying the following:
    - Inverter is off
    - The AC and DC disconnects are off
- Remove any lockout devices on AC and DC disconnects
- Make sure all combiner fuses are closed
- Close the AC disconnect
- Close the DC disconnect

After a short initialization period, the inverter will transition to “waking up” provided that the PV voltage is greater than the PV voltage start set point. After another short period (typically 5 minutes) the system will start up. The inverter cuts itself off when either AC or DC power is removed. It is best to remove both sources of power and you must do this before attempting to service the unit.

SITE SAFETY PROCEDURES

GENERAL WARNINGS!

- The equipment contains lethal AC and DC voltages!
- Site access is intended for authorized personnel only!
- These servicing instructions are for use by qualified personnel only!
- Equipment is supplied from multiple sources!

DO NOT VIOLATE SITE SAFETY AND OPERATION PROCEDURES

The installation, adjustment, repairs or testing of the Photovoltaic System involves possible contact with potentially lethal voltages and currents. No attempt to install or service the system should be made by anyone who is not qualified, trained technician familiar with SMA equipment.

Hazardous Locations

The following are deemed hazardous locations:

- Inverters and Disconnects: For hazardous locations within the inverter, refer to the Inverter Operations and Maintenance Manual.
- Vicinity of the Solar Electric Photovoltaic System.
- Field wiring and all electrical boxes associated with the system.

Precautions While in the Vicinity of the Solar Electric System

- Safety glasses and electrical insulating gloves must be worn when handling or working near the array, modules, electrical boxes, or wiring.
- It is recommended to always have at least two persons present when working on the array or handling modules. Do not attempt to service or adjust unless another person capable of rendering first aid and cardiopulmonary resuscitation (CPR) is also present.
- Any accidents should be immediately reported to a Supervisor, who should then report to Kearsarge Haddam Quarter LLC.
- The Photovoltaic Modules are made of glass and can be broken. Dropping or banging the modules may cause them to break, as may impact with sharp, hard or heavy objects. Along with electrical hazard, sharp edges or broken glass can cause injury. Be careful not to break modules and take care to properly handle and dispose of modules if they are cracked or broken.
- Any crack in the module can expose the person touching it to the full voltage and current of the array. If the module is wet, touching a cracked module anywhere may expose the person to the full voltage and current of the array. Do not touch the modules when they are exposed to the sun without wearing electrical insulating gloves. Do not touch a wet, cracked module without wearing electrical insulating gloves.
- A module may contain an unknown crack or connector failure at any time. Do not touch, handle or carry any wet module without wearing electrical insulating gloves.