DOCKETED

Docket Number:	09-AFC-05C
Project Title:	Abengoa Mojave Compliance
TN #:	201115
Document Title:	Mojave Solar Project Letter to D. Rundquist and Updated Appendix 1 to Petition to Amend
Description:	N/A
Filer:	Eric Janssen
Organization:	Ellison, Schneider & Harris L.L.P.
Submitter Role:	Applicant Representative
Submission Date:	11/5/2013 10:26:16 AM
Docketed Date:	11/5/2013

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RONALD LIEBERT

November 5, 2013

Mr. Dale Rundquist
Compliance Project Manager
Siting, Transmission and Environmental
Protection (STEP) Division
California Energy Commission
1516 Ninth Street, MS-2000
Sacramento, CA 95814

Re: 09-AFC-5C, Revised Petition to Amend the Commission's Certification of the Abengoa Mojave Solar Project

Dear Mr. Rundquist,

Attached is an updated Appendix 1, which is the submittal made to the Mojave Desert Air Quality Management District, to the "Revised Petition to Amend the Commission's Certification of the Abengoa Mojave Solar Project" ("Revised Petition"). The previously filed version omitted certain pages. This Appendix 1 replaces, in its entirety, the appendix submitted with the Revised Petition on October 29, 2013. No other sections of the Petition are modified and the relief requested in the Petition is unchanged.

Please call me at (916) 447-2166 if you have any questions.

Sincerely,

Samantha G. Pottenger
Attorney for Mojave Solar Project

Attachment

APPENDIX 1
REVISED PETITION TO AMEND THE COMMISSION'S CERTIFICATION OF THE ABENGOA MOJAVE SOLAR PROJECT 09-AFC-5C

Documents Submitted To The Mojave Desert Air Quality Management District

ABENGOA SOLAR

Mojave Solar LLC

13911 Park Avenue, Suite 206   Phone: 760-962-9200
Victorville, CA 92392   Fax: 303-962-9292

October 8, 2013

Mr. Chris Anderson
MDAQMD
14306 Park Avenue
Victorville, CA. 92392

Re: Mojave Solar, LLC Permit Amendment

Dear Mr. Anderson:

Abengoa and Mojave Solar, LLC are submitting two (2) copies of a permit amendment and support data to address several proposed changes and modifications to the Mojave Solar Project. The proposed changes include:

- Revise the general arrangement of the Alpha and Beta power blocks
- Modify the existing low boilers and high boilers cleaning distillation VOC control system to scrubbing and carbon adsorption VOC control system.
- Update the facility component counts with revision to the fugitive emissions inventory.
- Removal of the two (2) 21.5 MMBTU/hr boilers (application filed with MDAQMD on July 24th, 2013)
- Replace the current two (2) Tier II emergency generators at 2,500 KW with two (2) Tier II 2280 KW units
- Replace the current two (2) 346 HP Tier III fire pump engines with two (2) larger 575-617 HP Tier III engines
- Incorporate a change in the proposed supplier of the cooling towers.

As part of these design changes, revisions to the emission inventories, Best Available Control Technology (BACT), and project impacts to air quality and public health were assessed. The results of the amendment for air quality and public health indicate that the project will comply with the applicable standards, significant impact levels, and local/federal ordinances and laws.

Mojave Solar, LLC is concurrently submitting this amendment to the California Energy Commission.

Please find the enclosed permit application, support data and MDAQMD forms. In addition, we have included a permit application fee for $1,920. Also, note that some of the information submitted with the permit revision is to be treated as confidential. We have indicated which of the data is considered confidential.

The compact disk that contains the air quality modeling and health risk assessment input/output files associated with the modification will be submitted under separate cover. If you need another modeling disk or another copy of the application, please let me know.

Thank you for your attention in this matter. If you have any questions with regards to the application, please contact me at 303-323-9152.

Sincerely,

Frederick Redell - PE
General Manager, Mojave Solar LLC

ABENGOA SOLAR

Mojave Solar LLC
Abengoa Solar - Lakewood - Denver – USA
11500 West 13th Avenue
Lakewood, CO 80215
Phone: +13033239152 (86062) Cell: +13035135376 Fax: +13032332738
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Mojave Desert Air Quality Management District
14306 Park Avenue, Victorville, CA 92392-2310
760.245.1661 • FAX 760.245.2022

REQUEST TO CANCEL A PERMIT (ATC or PTO)

PERMIT ISSUED TO: Mojave Solar LLC

EQUIPMENT LOCATION (PHYSICAL ADDRESS): 42134 Harper Lake Road
Hinkley, Ca. 92347

OWNER OR OPERATOR (DISTRICT COMPANY NUMBER): 1876

EQUIPMENT LOCATION (DISTRICT FACILITY NUMBER): 03130

PERMIT NUMBER(S) TO CANCEL: B011040, B011041

EQUIPMENT DESCRIPTION: 21.5 mmbtu/hr natural gas fired aux boilers (2)

CANCELLATION OF THE PERMIT DESCRIBED ABOVE IS HEREBY REQUESTED FOR THE FOLLOWING REASON:

- [ ] Equipment sold, replaced, destroyed, or removed from premises (circle one).
- [ ] Equipment will no longer be used.
- [ ] Equipment is exempt from permit requirement by Rule 219 Section ____
- [ ] Replaced by Statewide Permit. ·Please attach copies of Statewide Permits.
- [x] Other: facility design changes have eliminated need for boilers

IT IS UNDERSTOOD THAT ANY FUTURE USE OF THIS EQUIPMENT MAY REQUIRE A NEW PERMIT APPLICATION IN ACCORDANCE WITH THE LAWS THEN IN EFFECT.

[signature] — Signature, responsible member of organization

General Manager — Title

Frederick Redell — Printed Name

303-513-5376 — Telephone No.

10/15/2013 — Date

MDAQMD USE ONLY

Signature of Engineering Supervisor ______________________ Date ______________

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
14306 Park Avenue, Victorville, CA 92392-2310
(760) 245-1661 Facsimile: (760) 245-2022

www.mdaqmd.ca.gov
Eldon Heaston
Executive Director

APPLICATION FOR AUTHORITY TO CONSTRUCT AND PERMIT TO OPERATE

Page 1 of 2: please type or print — REMIT $240.00 WITH THIS DOCUMENT ($137.00 FOR CHANGE OF OWNER)

1. Permit To Be Issued To (company name to receive permit): Mojave Solar LLC	1a. Federal Tax ID No.: 45-1741797
2. Mailing/Billing Address (for above company name): 13911 Park Ave., Suite 206 Victorville, CA. 92392	
3. Facility or Business License Name (for equipment location): Mojave Solar LLC	
4. Facility Address - Location of Equipment (if same as for company, enter "Same"): 42134 Harper Lake Rd., Hinkley, CA. 92347	Location UTM or Lat/Long:
5. Contact Name/Title: Holmes (Trey) Bassette, Director of Permitting — Email Address: holmes.bassette@solar.abengoa.com	Phone/Fax Nos.: 720-289-5542

6. Application is hereby made for Authority To Construct (ATC) and Permit To Operate (PTO) the following equipment:
Modify the current ATC

Air Pollution Control Equipment, if any (note that most APCE require a separate application):

7. Application is for: ☐ New Construction ☒ Modification* ☐ Change of Owner*
For modification or change of owner: *Current Permit Number: B011046

8. Type of Organization (check one): ☐ Individual Owner ☐ Partnership ☒ Corporation ☐ Utility ☐ Local Agency ☐ State Agency ☐ Federal Agency

9. General Nature of Business:	Principal Product:	SIC Code (if known):
Electricity production	Electricity	4911

10. Distances (feet and direction to closest):
_______ Fenceline _______ Residence _______ Business _______ School

11. Facility Annual Throughput by Quarters (percent):

Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
25 %	25 %	25 %	25 %

12. Expected Facility Operating Hours:

Hrs/Day	Days/Wk	Wks/Yr	Total Hrs/Yr
24	7	52	8760

13. Do you claim Confidentiality of Data (if yes, state nature of data on reverse in Remarks)? ☐ Yes ☒ No

14. Signature of Responsible Official: [signature]	Official Title: General Manager	
Typed or Printed Name of Responsible Official: Frederick Redell	Phone Number: 303-513-5376	Date Signed: 10/15/2013

- For District Use Only -

Application Number:	Invoice Number:	Permit Number:	Company/Facility Number:

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
GENERAL APPLICATION, continued

 please type or print

15. Stack Emissions Information:

Stack No.	Stack Height	Stack Diameter	Exhaust Temp	Exhaust Flow Rate	Exhaust Velocity
1	See permit application				
2					
3					

(list additional stacks on a separate sheet)

Stack Height is the distance above ground level to discharge point (feet)
Stack Diameter is the diameter (or equivalent circular diameter) of discharge point (nearest tenth foot)
If using cross-sectional area (A in square feet), equivalent diameter is D = (1.273A)^0.5
Exhaust Temp in degrees F, acutal or estimated to nearest 50 deg F
Exhaust Flow Rate at discharge point in actual cubic feet per minute (ACFM)
Exhaust Velocity in feet per second, design or measured

16. Remarks (basis for confidentiality of data, process description, modification description, etc.):

Modify existing ATC to remove the proposed distillation control system ont he HTF venting system and replace a carbon bed control system at the same control efficiency. See the attached description text file and data sheets.

If you wish to specify process information as proprietary or confidential, space is provided for this purpose. The kinds and rates of emissions may not be held confidential; emissions are subject to public disclosure.

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
14306 Park Avenue, Victorville, CA 92392-2310
(760) 245-1661 Facsimile: (760) 245-2022

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Eldon Heaston
Executive Director

APPLICATION FOR AUTHORITY TO CONSTRUCT AND PERMIT TO OPERATE

Page 1 of 2: please type or print — REMIT $240.00 WITH THIS DOCUMENT ($137.00 FOR CHANGE OF OWNER)

1. Permit To Be Issued To (company name to receive permit): Mojave Solar LLC
1a. Federal Tax ID No.: 45-1741797

2. Mailing/Billing Address (for above company name): 13911 Park Ave., Suite 206 Victorville, CA. 92392

3. Facility or Business License Name (for equipment location): Mojave Solar LLC

4. Facility Address - Location of Equipment (if same as for company, enter "Same"): 42134 Harper Lake Rd., Hinkley, CA. 92347
Location UTM or Lat/Long:

5. Contact Name/Title: Holmes (Trey) Bassette, Director of Permitting
Email Address: holmes.bassette@solar.abengoa.com
Phone/Fax Nos.: 720-289-5542

6. Application is hereby made for Authority To Construct (ATC) and Permit To Operate (PTO) the following equipment:
Modify the current ATC

Air Pollution Control Equipment, if any (note that most APCE require a separate application):

7. Application is for:
[ ] New Construction [x] Modification* [ ] Change of Owner*
For modification or change of owner: *Current Permit Number: B011047

8. Type of Organization (check one):
[ ] Individual Owner [ ] Partnership [x] Corporation [ ] Utility [ ] Local Agency [ ] State Agency [ ] Federal Agency

9. General Nature of Business: Electricity production
Principal Product: Electricity
SIC Code (if known): 4911

10. Distances (feet and direction to closest):
______ Fenceline ______ Residence ______ Business ______ School

11. Facility Annual Throughput by Quarters (percent):

Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
25 %	25 %	25 %	25 %

12. Expected Facility Operating Hours:

Hrs/Day	Days/Wk	Wks/Yr	Total Hrs/Yr
24	7	52	8760

13. Do you claim Confidentiality of Data (if yes, state nature of data on reverse in Remarks)? [ ] Yes [x] No

14. Signature of Responsible Official: [signature]
Official Title: General Manager

Typed or Printed Name of Responsible Official: Frederick Redell
Phone Number: 303-513-5376
Date Signed: 10/15/2013

- For District Use Only -

Application Number:	*Invoice Number:*	*Permit Number:*	*Company/Facility Number:*

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
GENERAL APPLICATION, continued

15. Stack Emissions Information:

Stack No.	Stack Height	Stack Diameter	Exhaust Temp	Exhaust Flow Rate	Exhaust Velocity
1	See application				
2					
3					

(list additional stacks on a separate sheet)

Stack Height is the distance above ground level to discharge point (feet)
Stack Diameter is the diameter (or equivalent circular diameter) of discharge point (nearest tenth foot)
If using cross-sectional area (A in square feet), equivalent diameter is D = (1.273A)^0.5
Exhaust Temp in degrees F, acutal or estimated to nearest 50 deg F
Exhaust Flow Rate at discharge point in actual cubic feet per minute (ACFM)
Exhaust Velocity in feet per second, design or measured

16. Remarks (basis for confidentiality of data, process description, modification description, etc.):

Modify existing ATC to remove the proposed distillation control system ont he HTF venting system and replace a carbon bed control system at the same control efficiency. See the attached description text file and data sheets.

If you wish to specify process information as proprietary or confidential, space is provided for this purpose. The kinds and rates of emissions may not be held confidential; emissions are subject to public disclosure.

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
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(760) 245-1661 Facsimile: (760) 245-2022

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Eldon Heaston
Executive Director

APPLICATION FOR INTERNAL COMBUSTION ENGINE (I.C.E.) ONLY

Page 1 of 2: please type or print — REMIT $240.00 WITH THIS DOCUMENT ($137.00 FOR CHANGE OF OWNER)

1. Permit To Be Issued To (company name to receive permit): Mojave Solar LLC
1a. Federal Tax ID No.: 45-1741797

2. Mailing/Billing Address (for above company name): 13911 Park Ave., Suite 206 Victorville, CA. 92392

3. Facility or Business License Name (for equipment location): Mojave Solar LLC

4. Facility Address - Location of Equipment (if same as for company, enter "Same"): 42134 Harper Lake Rd. Hinkley, CA. 92347
Facility UTM or Lat/Long:

5. Contact Name/Title: Holmes (Trey) Bassette, Director of Permitting
Email Address: holmes.bassette@solar.abengoa.com
Phone/Fax Nos.: 720-289-5542

6. Application is hereby made for Authority To Construct (ATC) and Permit To Operate (PTO) the following equipment: Change in EGS engine mfg and specifications

7. Application is for: ☐ New Construction ☒ Modification* ☐ Change of Owner*
For modification or change of owner: *Current Permit Number: E011042

8. Type of Organization (check one): ☐ Individual Owner ☐ Partnership ☒ Corporation ☐ Utility ☐ Local Agency ☐ State Agency ☐ Federal Agency

9. Distances (feet and direction to closest): ______ Fenceline ______ Residence ______ Business ______ School

10. General Nature of Business: Electrical power production

11. Principal Product: Electricity

12. Facility Annual Throughput by Quarters (percent):

25 %	25 %	25 %	25 %
Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec

13. Expected Operating Hours of IC Engine:

0.5	1	52	52
Hrs/Day	Days/Wk	Wks/Yr	Total Hrs/Yr

14. Do you claim Confidentiality of Data (if yes, state nature of data in attachment)? ☐ Yes ☒ No

15. Signature of Responsible Official: [signature]
Official Title: General Manager

Typed or Printed Name of Responsible Official: Frederick Redell
Phone Number: 303-513-5376
Date Signed: 10/15/2013

- For District Use Only -

Application Number:	*Invoice Number:*	*Permit Number:*	*Company/Facility Number:*

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
I.C.E. APPLICATION, continued

16. INFORMATION ON I.C.E.:

Manufacturer: MTU Friedrichshafen (Electro Molins)

Model No.: 16V4000G43 25 Serial No.: ______

Number of Cylinders: 16 Year of Manufacture: ~2013

Rating: 2280 Kw BHP Speed: ~1800 RPM

I.C.E. is? [x] New [ ] Existing Date Installed (MM/YYYY): TBD

Prime [ ] Standby [ ] Emergency [x] Portable (Yes or No)?: No

USEPA Family Name: 40 CFR 89 Tier 2 Compliant CARB Certification EO#: ______

Is this engine included in a Demand Response plan?: Yes [ ] No [x]

Type of Fuel(s): Natural Gas [ ] Digester Gas [ ] Ethanol [ ] Landfill Gas [ ]
Propane [ ] CARB Diesel [■] Methanol [ ] Other: ______

Max fuel usage per hour: 152.2 Fuel units (ft^3, gal, etc.): gallons

Engine Lat/Long or UTM Coordinates: see AFC site location data and maps

Exhaust Stack Height (feet): 30 Inside Diameter (inches): 12 Y/N: Vertical? Y Capped? N

Is this I.C.E. (select all that apply):

Direct Injected?	[ ]	After Cooled?	25
Turbo Charged?	x	Inter Cooled?	25
Timing Retarded?	[ ]	Other - Please specify:	see data sheet attached

17. EMISSION RATES:

Pollutant	at Max.Load	Units	Origin of Emission Rate data: Manufacturer	or Source Test
Oxides of Nitrogen (NOx)	see data sheet attached			
Oxides of Sulfur (SOx)				
Carbon Monoxide (CO)				
Particulates (PM10)				
Total Hydrocarbons (VOC)				

18. EMISSION CONTROL EQUIPMENT: Add on emission control equipment? [ ] Yes [✓] No

If yes: Manufacturer: ______ Model No.: ______

Serial No.: ______ *CARB EO#: ______

Type: SCR: [ ] Particulate Trap*: [ ] Ammonia Injection: [ ] Water Injection: [ ]
Non-S CR: [ ] Exhaust Gas Recirc*: [ ] Oxidation Catalyst*: [ ]

Other - Please specify: ______

19. INFORMATION OF ITEM BEING POWERED: This I.C.E. is used to power:

Electrical Generator	✓	Compressor	[ ]	Pump	[ ]
Paint Spray Gun	[ ]	Conveyor or Drive	[ ]	Fire Pump	[ ]

Other - Please specify: see data sheet attached

Manufacturer: ______

Model No.: ______ Serial No.: ______

Type, Size or Rating: ______

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APPLICATION FOR INTERNAL COMBUSTION ENGINE (I.C.E.) ONLY

Page 1 of 2: please type or print — REMIT $240.00 WITH THIS DOCUMENT ($137.00 FOR CHANGE OF OWNER)

1. Permit To Be Issued To (company name to receive permit): Mojave Solar LLC
1a. Federal Tax ID No.: 45-1741797

2. Mailing/Billing Address (for above company name): 13911 Park Ave., Suite 206 Victorville, CA. 92392

3. Facility or Business License Name (for equipment location): Mojave Solar LLC

4. Facility Address - Location of Equipment (if same as for company, enter "Same"): 42134 Harper Lake Rd. Hinkley, CA. 92347
Facility UTM or Lat/Long:

5. Contact Name/Title: Holmes (Trey) Bassette, Director of Permitting
Email Address: holmes.bassette@solar.abengoa.com
Phone/Fax Nos.: 720-289-5542

6. Application is hereby made for Authority To Construct (ATC) and Permit To Operate (PTO) the following equipment: Change in EGS engine mfg and specifications

7. Application is for: ☐ New Construction ☒ Modification* ☐ Change of Owner*
For modification or change of owner: *Current Permit Number: E011043

8. Type of Organization (check one): ☐ Individual Owner ☐ Partnership ☒ Corporation ☐ Utility ☐ Local Agency ☐ State Agency ☐ Federal Agency

9. Distances (feet and direction to closest): ________ Fenceline ________ Residence ________ Business ________ School

10. General Nature of Business: Electrical power production
11. Principal Product: Electricity

12. Facility Annual Throughput by Quarters (percent):

Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
25 %	25 %	25 %	25 %

13. Expected Operating Hours of IC Engine:

Hrs/Day	Days/Wk	Wks/Yr	Total Hrs/Yr
0.5	1	52	52

14. Do you claim Confidentiality of Data (if yes, state nature of data in attachment)? ☐ Yes ☒ No

15. Signature of Responsible Official: [signature]
Official Title: General Manager

Typed or Printed Name of Responsible Official: Frederick Redell
Phone Number: 303-513-5376
Date Signed: 10/15/2013

- For District Use Only -

Application Number:	*Invoice Number:*	*Permit Number:*	*Company/Facility Number:*

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
I.C.E. APPLICATION, continued

16. INFORMATION ON I.C.E.:

Manufacturer: MTU Friedrichshafen (Electro Molins)

Model No.: 16V4000G43 25 Serial No.: ______

Number of Cylinders: 16 Year of Manufacture: ~2013

Rating: 2280 Kw BHP Speed: ~1800 RPM

I.C.E. is? [x] New [ ] Existing Date Installed (MM/YYYY): TBD

Prime [ ] Standby [ ] Emergency [x] Portable (Yes or No)?: No

USEPA Family Name: 40 CFR 89 Tier 2 Compliant CARB Certification EO#: ______

Is this engine included in a Demand Response plan?: Yes [ ] No [x]

Type of Fuel(s): Natural Gas [ ] Digester Gas [ ] Ethanol [ ] Landfill Gas [ ]
Propane [ ] CARB Diesel [■] Methanol [ ] Other: ______

Max fuel usage per hour: 152.2 Fuel units (ft^3, gal, etc.): gallons

Engine Lat/Long or UTM Coordinates: see AFC site location data and maps

Exhaust Stack Height (feet): 30 Inside Diameter (inches): 12 Y/N: Vertical? Y Capped? N

Is this I.C.E. (select all that apply):

Direct Injected?	[ ]	After Cooled?	25
Turbo Charged?	x	Inter Cooled?	25
Timing Retarded?	[ ]	Other - Please specify:	

17. EMISSION RATES:

Pollutant	at Max.Load	Units	Origin of Emission Rate data: Manufacturer	or Source Test
Oxides of Nitrogen (NOx)	see data sheet attached			
Oxides of Sulfur (SOx)				
Carbon Monoxide (CO)				
Particulates (PM10)				
Total Hydrocarbons (VOC)				

18. EMISSION CONTROL EQUIPMENT: Add on emission control equipment? [ ] Yes [✓] No

If yes: Manufacturer: ______ Model No.: ______
Serial No.: ______ *CARB EO#: ______

Type: SCR: [ ] Particulate Trap*: [ ] Ammonia Injection: [ ] Water Injection: [ ]
Non-S CR: [ ] Exhaust Gas Recirc*: [ ] Oxidation Catalyst*: [ ]

Other - Please specify: ______

19. INFORMATION OF ITEM BEING POWERED: This I.C.E. is used to power:

Electrical Generator	✓	Compressor	[ ]	Pump	[ ]
Paint Spray Gun	[ ]	Conveyor or Drive	[ ]	Fire Pump	[ ]

Other - Please specify: ______

Manufacturer: ______

Model No.: ______ Serial No.: ______

Type, Size or Rating: ______

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APPLICATION FOR INTERNAL COMBUSTION ENGINE (I.C.E.) ONLY

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4. Facility Address - Location of Equipment (if same as for company, enter "Same"): 42134 Harper Lake Rd. Hinkley, CA. 92347		Facility UTM or Lat/Long:
5. Contact Name/Title: Holmes (Trey) Bassette, Director of Permitting	Email Address: holmes.bassette@solar.abengoa.com	Phone/Fax Nos.: 720-289-5542

6. Application is hereby made for Authority To Construct (ATC) and Permit To Operate (PTO) the following equipment:
Change in FP engine mfg and specifications

7. Application is for:
☐ New Construction ☒ Modification* ☐ Change of Owner*

For modification or change of owner:
*Current Permit Number: E011044

8. Type of Organization (check one):
☐ Individual Owner ☐ Partnership ☒ Corporation ☐ Utility ☐ Local Agency ☐ State Agency ☐ Federal Agency

9. Distances (feet and direction to closest):
______ Fenceline ______ Residence ______ Business ______ School

10. General Nature of Business:	11. Principal Product:
Electrical power production	Electricity

12. Facility Annual Throughput by Quarters (percent):

Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
25 %	25 %	25 %	25 %

13. Expected Operating Hours of IC Engine:

Hrs/Day	Days/Wk	Wks/Yr	Total Hrs/Yr
0.5	1	52	52

14. Do you claim Confidentiality of Data (if yes, state nature of data in attachment)? ☐ Yes ☒ No

15. Signature of Responsible Official:	Official Title:	
[signature]	General Manager	
Typed or Printed Name of Responsible Official:	Phone Number:	Date Signed:
Frederick Redell	303-513-5376	10/15/2013

- For District Use Only -

Application Number:	*Invoice Number:*	*Permit Number:*	*Company/Facility Number:*

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
I.C.E. APPLICATION, continued

16. INFORMATION ON I.C.E.:

Manufacturer: Clarke

Model No.: UFAD88 25 Serial No.: ____

Number of Cylinders: 6 Year of Manufacture: ~2013

Rating: 542-617 BHP Speed: ~1760 RPM

I.C.E. is? [x] New [ ] Existing Date Installed (MM/YYYY): TBD

Prime [ ] Standby [ ] Emergency [x] Portable (Yes or No)?: No

USEPA Family Name: DJDXL13.5103 CARB Certification EO#: n/a

Is this engine included in a Demand Response plan?: Yes [ ] No [x]

Type of Fuel(s): Natural Gas [ ] Digester Gas [ ] Ethanol [ ] Landfill Gas [ ]

Propane [ ] CARB Diesel [■] Methanol [ ] Other: ____

Max fuel usage per hour: 29.2 Fuel units (ft^3, gal, etc.): gallons

Engine Lat/Long or UTM Coordinates: see AFC site location data and maps

Exhaust Stack Height (feet): 20 Inside Diameter (inches): 8 Y/N: Vertical? Y Capped? N

Is this I.C.E. (select all that apply):

Direct Injected?	[ ]	After Cooled?	25
Turbo Charged?	x	Inter Cooled?	25
Timing Retarded?	[ ]	Other - Please specify:	see data sheet attached

17. EMISSION RATES:

Pollutant	at Max.Load	Units	Origin of Emission Rate data: Manufacturer	or Source Test
Oxides of Nitrogen (NOx)	see data sheet attached			
Oxides of Sulfur (SOx)				
Carbon Monoxide (CO)				
Particulates (PM10)				
Total Hydrocarbons (VOC)				

18. EMISSION CONTROL EQUIPMENT: Add on emission control equipment? [ ] Yes [✓] No

If yes: Manufacturer: ____ Model No.: ____

Serial No.: ____ *CARB EO#: ____

Type: SCR: [ ] Particulate Trap*: [ ] Ammonia Injection: [ ] Water Injection: [ ]

Non-S CR: [ ] Exhaust Gas Recirc*: [ ] Oxidation Catalyst*: [ ]

Other - Please specify: ____

19. INFORMATION OF ITEM BEING POWERED: This I.C.E. is used to power:

Electrical Generator [ ] Compressor [ ] Pump [ ]

Paint Spray Gun [ ] Conveyor or Drive [ ] Fire Pump [✓]

Other - Please specify: see data sheet attached

Manufacturer: ____

Model No.: ____ Serial No.: ____

Type, Size or Rating: ____

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT www.mdaqmd.ca.gov
14306 Park Avenue, Victorville, CA 92392-2310 *Eldon Heaston*
(760) 245-1661 Facsimile: (760) 245-2022 Executive Director

APPLICATION FOR INTERNAL COMBUSTION ENGINE (I.C.E.) ONLY

 REMIT $240.00 WITH THIS DOCUMENT ($137.00 FOR CHANGE OF OWNER)

1. Permit To Be Issued To (company name to receive permit): Mojave Solar LLC
1a. Federal Tax ID No.: 45-1741797

2. Mailing/Billing Address (for above company name): 13911 Park Ave., Suite 206 Victorville, CA. 92392

3. Facility or Business License Name (for equipment location): Mojave Solar LLC

4. Facility Address - Location of Equipment (if same as for company, enter "Same"): 42134 Harper Lake Rd. Hinkley, CA. 92347
Facility UTM or Lat/Long:

5. Contact Name/Title: Holmes (Trey) Bassette, Director of Permitting
Email Address: holmes.bassette@solar.abengoa.com
Phone/Fax Nos.: 720-289-5542

6. Application is hereby made for Authority To Construct (ATC) and Permit To Operate (PTO) the following equipment: Change in FP engine mfg and specifications

7. Application is for:
☐ New Construction ☒ Modification* ☐ Change of Owner*
For modification or change of owner: *Current Permit Number: E011045

8. Type of Organization (check one):
☐ Individual Owner ☐ Partnership ☒ Corporation ☐ Utility ☐ Local Agency ☐ State Agency ☐ Federal Agency

9. Distances (feet and direction to closest):
_____ Fenceline _____ Residence _____ Business _____ School

10. General Nature of Business: Electrical power production

11. Principal Product: Electricity

12. Facility Annual Throughput by Quarters (percent):

Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
25 %	25 %	25 %	25 %

13. Expected Operating Hours of IC Engine:

Hrs/Day	Days/Wk	Wks/Yr	Total Hrs/Yr
0.5	1	52	52

14. Do you claim Confidentiality of Data (if yes, state nature of data in attachment)? ☐ Yes ☒ No

15. Signature of Responsible Official: [signature]
Official Title: General Manager

Typed or Printed Name of Responsible Official: Frederick Redell
Phone Number: 303-513-5376
Date Signed: 10/15/2013

- For District Use Only -

Application Number:	*Invoice Number:*	*Permit Number:*	*Company/Facility Number:*

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
I.C.E. APPLICATION, continued

Page 2 of 2: please type or print

16. INFORMATION ON I.C.E.:

Manufacturer: Clarke

Model No.: UFAD88 25 Serial No.: ______

Number of Cylinders: 6 Year of Manufacture: ~2013

Rating: 542-617 BHP Speed: ~1760 RPM

I.C.E. is? [x] New [ ] Existing Date Installed (MM/YYYY): TBD

Prime [ ] Standby [ ] Emergency [x] Portable (Yes or No)?: No

USEPA Family Name: DJDXL13.5103 CARB Certification EO#: n/a

Is this engine included in a Demand Response plan?: Yes [ ] No [x]

Type of Fuel(s): Natural Gas [ ] Digester Gas [ ] Ethanol [ ] Landfill Gas [ ]
Propane [ ] CARB Diesel [■] Methanol [ ] Other: ______

Max fuel usage per hour: 29.2 Fuel units (ft^3, gal, etc.): gallons

Engine Lat/Long or UTM Coordinates: see AFC site location data and maps

Exhaust Stack Height (feet): 20 Inside Diameter (inches): 8 Y/N: Vertical? Y Capped? N

Is this I.C.E. (select all that apply):

Direct Injected?	[ ]	After Cooled?	25
Turbo Charged?	x	Inter Cooled?	25
Timing Retarded?	[ ]	Other - Please specify:	see data sheet attached

17. EMISSION RATES:

Pollutant	at Max.Load	Units	Origin of Emission Rate data: Manufacturer	or Source Test
Oxides of Nitrogen (NOx)	see data sheet attached			
Oxides of Sulfur (SOx)				
Carbon Monoxide (CO)				
Particulates (PM10)				
Total Hydrocarbons (VOC)				

18. EMISSION CONTROL EQUIPMENT: Add on emission control equipment? [ ] Yes [✓] No

If yes: Manufacturer: ______ Model No.: ______

Serial No.: ______ *CARB EO#: ______

Type: SCR: [ ] Particulate Trap*: [ ] Ammonia Injection: [ ] Water Injection: [ ]
Non-S CR: [ ] Exhaust Gas Recirc*: [ ] Oxidation Catalyst*: [ ]

Other - Please specify: ______

19. INFORMATION OF ITEM BEING POWERED: This I.C.E. is used to power:

Electrical Generator [ ] Compressor [ ] Pump [ ]
Paint Spray Gun [ ] Conveyor or Drive [ ] Fire Pump [✓]

Other - Please specify: see data sheet attached

Manufacturer: ______

Model No.: ______ Serial No.: ______

Type, Size or Rating: ______

Mojave Solar Project Permit Amendment

October 2013

This amendment and the attached support information address the proposed changes and modifications to the Mojave Solar Project. A discussion of the present project is presented below and includes a project description, the regulatory history, the permitted activities, the current emissions estimates, and the final Best Available Control Technology (BACT) determinations. The proposed changes and modifications are summarized, and then discussed in detail with respect to emissions, processes, BACT, and finally, impacts.

In summary, the proposed changes include:

- Revise the general arrangement of the Alpha and Beta power blocks
- Modify the existing low boilers and high boilers cleaning distillation VOC control system to scrubbing and carbon adsorption VOC control system.
- Update the facility component counts with revision to the fugitive emissions inventory.
- Removal of the two (2) 21.5 MMBTU/hr boilers (application filed with MDAQMD on July 24th, 2013)
- Replace the current two (2) Tier II emergency generators at 2,500 KW with two (2) Tier II 2280 KW units
- Replace the current two (2) 346 HP Tier III fire pump engines with two (2) larger 575-617 HP Tier III engines
- Incorporate a change in the proposed supplier of the cooling towers with no other changes proposed.

As part of these design changes, revisions to the emission inventories, BACT, and project impacts to air quality and public health were assessed. The results of the amendment for air quality and public health indicate that the project will comply with the applicable standards, significant impact levels, and local/federal ordinances and laws.

<u>Current Project (Licensed)</u>

Mojave Solar LLC (herein "MSLLC" or "Applicant"), has proposed to construct, own and operate the Mojave Solar Project (herein "MSP" or "Project"). MSLLC is a Delaware limited liability company. Abengoa Solar Inc. (ASI), a Delaware corporation, specializes in solar technologies and is the parent company of MSLLC. The Project is a solar electric generating facility proposed on approximately 1765 acres in unincorporated San Bernardino County, California approximately 9 miles northwest of Hinkley, CA. The site is largely fallow agricultural land specifically sited and configured to minimize environmental impacts. This land was originally sited as Solar Electric Generating Stations (SEGS) XI and XII and is located next to the existing SEGS VIII and IX facilities.

The Project will implement well-established parabolic trough technology to solar heat a heat transfer fluid (HTF). This hot HTF will generate steam in solar steam generators (SSGs); which will expand through a steam turbine generator (STG) to produce electrical power.

The Project will have a combined nominal electrical output of 250 megawatts (MW) from twin, independently-operable solar fields, each feeding a 125-MW plant. The plant sites, identified as Alpha (the northwest portion of the Project area) and Beta (the southeast portion of the Project area), will be 884 acres and 800 acres respectively and joined at the transmission line interconnection substation to form one full-output transmission interconnection. An additional 81 acres shared between the plant sites will be utilized for receiving and discharging offsite drainage improvements. Start of commercial operation is planned for winter of 2014, subject to timing of regulatory approvals and Applicant achievement of Project equipment procurement and construction milestones.

The sun will provide 100 percent (%) of the power supplied to the Project through solar-thermal collectors; no supplementary fossil-based energy source (e.g., natural gas) is proposed for electrical power production. As presently proposed, each plant will have a natural-gas-fired auxiliary boiler to provide equipment freeze protection and HTF freeze protection. The auxiliary boiler will supply steam to HTF heat exchangers as needed during offline hours to keep the HTF in a liquid state when ambient temperatures fall below its freezing point of 54 degrees Fahrenheit (F). Each plant will also have a diesel-engine-driven firewater pump for fire protection and a diesel-engine-driven backup generator for power plant essentials.

Project Regulatory Background

In August of 2009, the Applicant submitted the Application for Certification to the California Energy Commission. Preliminary and final staff assessments were prepared in March, May, and June of 2010, and the PMPD for the Project was issued in August 2010. The CEC issued its final decision on the project in September 2010 (CEC 800-2010-008 CMF). During the timeframe above, the Mojave Desert AQMD also prepared its preliminary and final determinations of compliance (PDOC and FDOC). The FDOC (Rev A) was issued on July 1, 2010.

Existing Project Processes and Emissions

The CEC final decision was based on the following equipment and process list:

- Two 21.5 MMBTU natural gas-fueled auxiliary HTF heaters, one per plant, used to maintain the temperature of the HTF above freezing during cold months and pre-warming for daily startup year-round;
- Two 6-cell wet-cooling towers, one per plant, each to provide cooling and heat rejection from a single plant process;
- Two 346-hp diesel-fired emergency fire water pump engines, one per plant;

- Two 4,160-hp diesel engine-driven emergency generators, one per plant;
- One 2,000 gallon gasoline tank and one 2,000 gallon diesel tank that would refuel onsite dedicated vehicles for both plants;
- HTF Ullage/Expansion system comprised of (each plant):
    - Five (5) vertical ASME-rated expansion tanks
    - One (1) nitrogen condensing ASME- rated tank
    - Two (2) vertical HTF storage tanks with cooling condensers on the vent stacks
    - Low boilers and high boilers cleaning system (distillation)
    - Associated piping and components (Attachment 1)
- Two separate HTF piping systems for each plant with a total facility component count of 3,247 valves, 8,120 flanges/connectors, 24 pump seals, and 16 pressure relief valves.
- Spent HTF waste load-out;
- Two bio-remediation/ land treatment units (LTU), one per plant, to treat HTF-contaminated soils; and,
- On-site diesel and gasoline fueled maintenance vehicles used for mirror washing and other maintenance/operation support activities.

The CEC Decision referenced the operational emissions estimates in the Air Quality section of the AFC as well as the MDAQMD FDOC. The CEC final decision also contained the MDAQMD proposed conditions for certification.

The MDAQMD FDOC (Rev A, dated 7-1-10) summarizes the existing permitted process and equipment list as follows:

- two (2) latest tier emergency fire pump engines rated at approximately 346 hp,
- two (2) latest tier emergency generator sets rated at 4160 hp (2500 kW),
- two (2) auxiliary natural gas fired boilers each rated at ~21.5 MMBTU/hr,
- two (2) wet cooling towers (six cells each),
- two (2) HTF ullage/expansion systems with nitrogen blanket, tank and vent cooling condenser, and,
- one (1) gasoline dispensing facility.

The CEC Supplemental Staff Assessment (CEC-700-2010-003, May 2010) presented the following emissions estimates for the facility. The VOC emissions include fugitive sources such as valves, flanges, seals, etc.

Table 1 – CEC SSA Project Emissions Estimates					
Parameter	**NOx**	**CO**	**VOC**	**SOx**	**$PM_{10/2.5}$**
Lbs/day	57.97	43	80.24	0.64	79.72
Tons/yr	2.96	2.08	12.92	0.03	13.47
Ref: CEC Supplemental Staff Assessment (CEC-700-2010-003, May 2010, Air Quality Table 9) Values do not include maintenance vehicle or fugitive dust emissions.					

The primary reason for the differences in the CEC versus AQMD process/equipment list is that the CEC looks at all emissions sources while the AQMD considers sources subject to its permitting jurisdiction.

<u>Existing Project BACT Determinations</u>

Pursuant to the MDAQMD FDOC the following BACT determinations were identified:

HTF Expansion Tank and Ullage Vent System

VOC – 99% overall recovery, daily inspection of system, maintenance plan

NOx, SOx, CO, PM – n/a

Cooling Tower

PM – drift rate not to exceed 0.0005%

21.5 MMBTU/hr Natural Gas Boilers

NOx – 9.0 ppm at 3% O2 (ultra LNB)

VOC, PM, SOx – PUC quality natural gas

CO – 50 ppm at 3% O2 (ultra LNB)

Emergency Fire Pumps (2)

NOx, VOC, CO, PM – meet current EPA/CARB Tier III standards

SOx – 15 ppm S diesel fuel

Emergency Generators (2)

NOx, VOC, CO, PM – meet current EPA/CARB Tier II standards

SOx – 15 ppm S diesel fuel

Gasoline Storage/Dispensing System

VOC – Phase I/Phase II VAREC

NOx, SOx, CO, PM – n/a

Amendment – Revised Facility/Process Modifications

The project applicant is proposing the following modifications to the project:

- Revise the Alpha and Beta Blocks General Arrangement (GA) to reflect new equipment and building/process area locations.
- Removal of the existing low boilers and high boilers cleaning distillation VOC control system and implementation of a scrubbing and carbon adsorption VOC control system.
- High Boiler and Low Boiler streams returned to system with some low boilers removed through the carbon adsorption system.
- Update the facility component counts with revision to the fugitive emissions inventory (Attachment 1).
- Use four (4) vertical ASME-rated expansion vessels (based on a reduction of HTF quantity) per plant.
- Update the two (2) vertical HTF storage tank's condensers on the vent stacks with a scrubber on the vent stream for each plant.
- Removal of the two (2) 21.5 MMBTU/hr boilers (Application filed with MDAQMD on July 24th, 2013)
- Replace the current two (2) Tier II emergency generators at 2,500 KW with two (2) Tier II 2280 KW units
- Revise the current Tier II emergency generators stack height to 30 feet above ground level (AGL)
- Replace the current two (2) 346 HP Tier III fire pump engines with two (2) larger 575-617 HP Tier III engines
- Remove the operational testing restriction of one (1) emergency engine per hour with the simultaneous testing of all emergency equipment, and,
- Incorporate a change in the proposed supplier of the cooling towers with no other changes proposed.

The projected result of these modifications is that the facility emissions will change slightly on an hourly, daily, and annual basis. Each of these changes is discussed in detail below. There are no changes to the existing property fence lines. In addition, MDAQMD permit application forms for each proposed change in permitted equipment are included in Attachment 4.

Revised Control Technology Evaluation/BACT Determination

BACT is required for any new permit unit which emits or has the potential to emit (PTE) 25 pounds per day (lbs/day) or more of any nonattainment air pollutant (MDAQMD Rule 1303(A)). The project site is in a state nonattainment area for ozone and is unclassified for PM10 and their precursors. Based on the revised daily emissions for each of the various devices/processes, BACT is triggered for the emergency generator engines and the cooling towers.

MDAQMD RULE 1303 Requirements state the following:

(A) Best Available Control Technology is required on:

(1) Any new Permit Unit which emits, or has the Potential to Emit, 25 pounds per day or more of any Nonattainment Air Pollutant shall be equipped with BACT,

(2) Any Modified Permit Unit which emits, or has the Potential to Emit, 25 pounds per day or more of any Nonattainment Air Pollutant shall be equipped with BACT,

(3) Any new or Modified Facility which emits, or has the Potential to Emit, 25 tons per year or more of any Nonattainment Air Pollutant shall be equipped with BACT for each new Permit Unit.

(4) For purposes of determining applicability of this Section, Potential to Emit is defined by District Rule 1301(UU) and SERs shall not be utilized to reduce such Potential to Emit.

Ullage System Modifications

The Applicant is proposing to incorporate the following changes into the existing Ullage system at each plant:

	Existing Permitted Equipment (each plant)	Proposed Changes
1	Five Vertical ASME-rated expansion vessels	Four vertical ASME expansion vessels based on reduced HTF capacity, with a Nitrogen Ullage Cooler on the expansion vessel vent stack before the scrubber
2	One horizontal nitrogen-condensing ASME-rated vessel	Rename Nitrogen Condensing Receiver to Low Boiler Condensate Receiver Vessel
3	Two vertical HTF storage/overflow tanks with cooling condensers on vent stacks	Replace cooling condensers with a scrubber
4	HTF Circulation Pumps	Same as originally proposed

5	Low Boilers and High Boilers cleaning system (distillation)	Two vent scrubbers and carbon adsorption system
6	The HTF storage/overflow tanks have a liquid HTF air cooler to maintain temperature	Replace liquid HTF air cooler with water-cooled liquid HTF cooler
7	All associated valves, flanges/connectors, pump seals and pressure relief valves	Updated component count
8	All associated temperature monitoring devices	Same as originally proposed

Nitrogen Venting of the HTF System

The heat transfer fluid (HTF) will be Therminol VP-1, produced by Solutia, Inc., or equivalent product from Dow (Dowtherm A), which is comprised of diphenyl ether (73 - 73.5%) and biphenyl (26.5 - 27%). This material in gaseous form represents VOCs. Over time, HTF thermally degrades into lower molecular weight compounds (low boilers) and higher molecular weight compounds (high boilers). Low boilers primarily consist of benzene and phenol, and some toluene. High boilers primarily consist of dibenzofuran. The ullage system is designed to reduce the low boilers and HTF emission into the atmosphere.

The Mojave project is comprised of two 140 MW (gross) plants, Alpha and Beta. The process data presented in Attachment 1 (to be treated as confidential information) are representative of a single plant and the total project site is expected to have approximately twice the numbers listed on the diagram, i.e., the solar field configurations are slightly different which results in minor differences in HTF volumes at each plant. The HTF system of each plant consists of 4 vertical ASME-rated expansion vessels, one horizontal ASME rated low boiler condensate receiver vessel, one nitrogen ullage cooler, two ullage vent scrubbers, two sets of activated carbon filters, and two vertical HTF storage/overflow tanks.

The expansion vessels are sized to contain the volumetric expansion and contraction of HTF during normal daily cyclic operation. As HTF expands when it is heated during daily start up, the level in the expansion vessels rises. The nitrogen in the vapor space of the expansion vessels is first compressed and then displaced. The displaced nitrogen contains some HTF and low boilers and is treated in the ullage system before venting to the atmosphere.

As HTF contracts during shutdown it cools, causing the level in the expansion vessels to fall. After some initial vapor expansion, nitrogen make up is routed to the expansion vessels to maintain a minimum pressure. The pressure in the expansion vessels is controlled. Venting is reduced by operating the expansion vessels in a range of pressure – versus a specific pressure.

During some winter nights, low ambient temperature further cools the HTF. As HTF contracts during cooling, additional HTF is pumped from the HTF overflow tanks into the expansion vessels to maintain a minimum liquid level. HTF is returned to the overflow tanks when it is heated up during start up. Nitrogen is added as the level in the tanks fall and vapor is vented via ullage system as the level rises. The overflow tanks are maintained below the design pressure of 2.5 psig.

Types of Venting

There are two types of venting from the HTF system:

- Venting of nitrogen due to HTF overflow tank breathing
- Daily venting of vapor space due to HTF expansion into the expansion vessels.

Overflow/Storage Tank Venting: During winter months, HTF temperature may fall below nominal operating range. HTF is transferred from the overflow tanks to the expansion vessels to maintain the minimum expansion vessels' level. The change in overflow tank levels results in make-up and venting of the vapor space.

The overflow tanks operate between 120 ˚F and 350 ˚F. When hot HTF is routed to the tanks, HTF in the tanks circulates through a water-cooled HTF Tank Cooler. It is cooled over a period of several hours.

The vapor space in the overflow tank is primarily nitrogen with a small quantity of HTF and low boilers. The worst case emission is based on an estimated HTF system temperature reaching about 120 ˚F after a few days without operating the solar field. All the HTF from the overflow tanks would be transferred to the expansion vessels. The next time the system is brought back to normal operation, all of the HTF that was pumped out of the overflow tanks would return to the overflow tanks. Under that condition, the total amount of vapor vented is estimated to be about 25,000 cubic feet total for both plants.

Vapor from the overflow tanks is scrubbed by liquid HTF at approximately 120 ˚F via countercurrent flow in a packed column to reduce HTF and low boiler contents in the vapor before routed to a carbon adsorption system for further removal of these components.

Expansion Vessel Venting: Venting from the expansion vessels occurs when HTF expands with increasing system temperature and the liquid level in the expansion vessels increase. The vapor consists of primarily nitrogen with some HTF and low boilers. Emission reduction for the expansion vessels is similar to overflow tanks, with added cooling. The vent stream from the expansion vessels is cooled in a water-cooled condenser, called the Nitrogen Ullage Cooler. HTF and low boilers are condensed and collected in the Low Boiler Condensate Receiver Vessel. HTF and low boilers are further removed as the vent stream is routed through the scrubber and carbon adsorption system before venting to the atmosphere, similar to the HTF Overflow Tank vent.

Carbon Bed Adsorption: Historical data on BACT for the HTF systems of similar size utilizing Therminol VP-1 (or equivalent) has been determined to be a VOC control system having a control efficiency of 95%. These BACT determinations also include an inspection and maintenance plan to minimize fugitive leaks through the implementation of a leak detection and repair program.

The proposed use of an HTF Expansion Vessel/Ullage Vent System consisting primarily of nitrogen-blanketed expansion and storage tanks, a Low Boiler and High Boiler cleaning system (distillation), with the use of cooling condensers on the tank vent stacks has an overall VOC control/recovery efficiency of 99%. Thus, the originally proposed system meets or exceeds current BACT control efficiency levels.

The primary change with the Ullage System will be the removal of the distillation system for the control of VOC emissions, and replacing it with a scrubber and carbon bed adsorption system. With the use of scrubbing and carbon adsorption, the vent coolers from the HTF Overflow Tanks are no longer necessary.

Carbon bed adsorption technology is where a VOC gas stream passes through a bed of activated carbon. Vapor phase activated carbon is proven technology and successfully used for the removal of volatile organic compounds such as hydrocarbons, toxic gases etc. Activated carbon adsorption vapor recovery units utilize the carbon's ability to preferentially adsorb certain molecules from gaseous mixtures. Activated carbon, with its highly porous structure and vast surface area, adsorbs hydrocarbons from the vapors generating source. The hydrocarbon molecules are adsorbed onto the carbon surface and are retained there until the regeneration step. Adsorption of the hydrocarbon molecules proceeds until the available surface area of the carbon is filled or saturated with the hydrocarbon molecules. The exhausted carbon bed is sent offsite for regeneration or disposal.

Thus, the project proposes to operate a carbon adsorption system where the residual uncondensed HTF, benzene and phenol along with nitrogen will pass through carbon beds (horizontal vessels). Activated carbon will capture the uncondensed HTF and low boilers like benzene and phenol which are products of HTF degradation.

No changes to the overall VOC control efficiency are expected with the cumulative control efficiency rated at 99% recovery. The Applicant believes, based on the re-design of the system which incorporates the carbon adsorption system, the VOC emissions will essentially remain the same as described below. Attachment 1 contains the process flow block diagram for the modified ullage system with the newly proposed carbon adsorption system. It also contains the estimated component counts. Abengoa formally requests that the information presented in Attachment 1 be treated as confidential information.

Based on the above design considerations and system control efficiency, the project is not anticipating the need for any additional add-on VOC controls.

Emissions Summary

Table 2 includes a breakdown of VOC emissions on a system basis for both the HTF overflow and expansion venting emissions and HTF fugitive emissions. The values listed in the table represent values for a single plant, and the two plant (facility) totals. The component counts, listed in Attachment 1 (confidential data) were based on updated plant design data which also included adding a 15 percent margin (increase) to the counts to reflect a conservative estimate for emissions calculations. Additionally, the toxic emissions from HTF in the ullage system inventory represent decomposition data from the expansion vessel(s) vapor stream compositions calculated in the Aspen output schematics in Attachment 1.

Table 2 Emissions Summary for Proposed Modified Ullage System									
Compound	HTF Overflow and Expansion Venting Emissions[2]					HTF Fugitive Emissions[2]			
Period	lbs/hr Nominal	lbs/day Nominal	lbs/day Maximum	lbs/yr	tons/yr	lbs/hr	lbs/day	lbs/yr	tons/yr
VOC (per Plant)[1]	-	2.17	4.34	792.05	0.395	1.56	24.76	9036.8	4.52
VOC (2 Plant Total)	-	4.34	8.68	1584.1	0.79	3.11	49.52	18073.7	9.04

[1] VOCs include: diphenyl ether, biphenyl, benzene, toluene, phenol, and dibenzofurans (high boilers).

[2] HTF fugitive VOC emissions were estimated from component counts. Individual compositions are based on the vapor fractions as shown in Attachment 1. HTF Overflow and Expansion Venting emissions were derived from the Aspen analysis which is also part of Attachment 1.

Table 3 presents a summary of the ullage system and HTF fugitive air toxic emissions for both plants combined.

Table 3 Air Toxic Emissions Estimates for Ullage System and HTF Fugitives(Facility total-2 plants)					
Pollutant	HTF Overflow and Expansion Venting Emissions			HTF Fugitive Emissions	
	lbs/day Nominal	lbs/day Maximum	lbs/yr	lbs/day	lbs/yr
Diphenyl ether	0.68	1.36	248.2	4.52	9036.83
Biphenyl	0.26	0.52	94.9	13.81	3343.63
Benzene	2.78	5.56	1014.7	14.12	3415.92
Toluene	0.10	0.20	36.5	1.27	307.25
Phenol	0.48	0.96	175.2	5.90	1427.82
Dibenzofuran (High Boilers)	0.04	0.08	14.6	2.32	560.28

As summarized in Table 2, the average daily facility VOC emission is 4.34 lbs/day. Out of the 4.34 lb/day VOC emissions, 2.78 lbs/day is benzene, as shown in Table 3. This is based on a typical operational day where the venting duration is 40 minutes per day from the expansion vessels and 20 minutes per day from the HTF overflow tanks. This typical daily emission is referred to as “nominal” in tables 2 and 3. Annual emission is calculated based on the nominal daily values.

Actual venting duration will vary from day to day. On some days, weather or operating conditions may lead to fluctuation of the HTF temperature or solar field shutdown and restart later on the same day. On those days, the expansion vessels and the overflow tanks would vent for an additional cycle, leading to twice the nominal emission. Therefore, on certain days of the year, the potential facility maximum daily emissions could be 8.68 lbs/day VOC and 5.56 lbs/day of benzene, on a per plant basis. Maximum potential daily emissions are referred to as "maximum" in the previous tables.

It should be noted that VOC fugitive emissions, as noted in the table above represent a decrease as compared to the emissions estimated in the CEC AFC Data Request Set 1A responses. Previously calculated VOC venting and fugitive emissions per plant, were on the order of:

- 2.44 - 2.64 lbs/hr
- 22.12 – 26.42 lbs/day
- 4.04 – 4.82 tons/yr

Attachment 1 (confidential filing) contains copies of the proposed ullage system design changes, i.e., revised technical specification sheets and revised process flow diagrams.

Waste hauling (total load-out emissions for the nominal 250 MW facility) were estimated to be approximately 0.0013 lbs/hr, 0.0013 lbs/day, 0.0157 lbs/yr, or 7.84E-6 tpy.

These proposed changes represent current BACT and therefore they maintain the BACT determination for the ullage system.

Removal of the 21.5 MMBTU/hr Auxiliary Boilers

The permits for the two (2) auxiliary boilers (each rated at 21.5 MMBTU/hr) were formally requested to be cancelled on July 24, 2013 in a letter sent to the MDAQMD. These boilers are no longer needed, and as such, they will not be installed or operated at the site. The removal of these units will result in the following emissions decreases (per the FDOC, Rev A, 7-1-10). See Table 4 below.

Table 4   Emissions Decreases Resulting from Auxiliary Boiler (2) Removal

Pollutant	Lbs/hr	Lbs/day	Tons/Yr
NO_x	0.473	11.5	0.518
CO	1.63	39.2	1.79
VOC	0.461	11.1	0.505
SO_x	0.0252	0.604	0.0276
PM10/2.5	0.319	7.65	0.349
CO_2e	-	-	11,000

Replace the Proposed Tier II Emergency Generator Sets with Slightly Smaller Tier 2 Engines

The currently proposed Tier II emergency generator engines are rated at approximately 2500 kWe, firing diesel fuel. The original proposal was to use a Caterpiller 3516C-HD (or equivalent) generator set engines meeting the Tier II standards. The Applicant is now proposing to use a German built engine (MTU Friedrichshafen), rated at approximately 2280 kWe (~3057 bhp), and meeting the Tier II standards. This change in engine model/manufacturer results in slight changes to emissions as previously estimated. See Table 5 below.

Table 5 EGS Engine Emissions Comparison

Pollutant	Current Engines (each)				Proposed New Engines (each)			
	g/bhp-hr	lb/hr*	lb/day*	TPY	g/bhp-hr	lb/hr*	lb/day*	TPY
NO_x	5.05	46.61	46.61	1.212	4.59	32.17	32.17	0.836
CO	0.41	3.78	3.78	0.098	2.64	17.59	17.59	0.457
VOC	0.1	0.92	0.92	0.024	0.24 (1)	1.62	1.62	0.042
SO_x	-	0.04	0.04	0.0009	-	0.031	0.031	0.0008
PM10/2.5	0.036	0.33	0.33	0.009	0.15	1.01	1.01	0.026

*Emissions shown for 60 minutes per test. Actual testing (as reflected in the modeling) will be each of these engines run for a maximum of 30 minutes in any given test hour and per test day.

52 hrs/yr/engine

(1)VOC derived by using CARB protocol to split combined NOx+NMHC factor.

Emissions in Figure 1 are based on NOx+NMHC as total NOx for modeling purposes.

Use of Tier II engines represents current BACT, and the original BACT determination is still considered valid.

Attachment 2 contains the new emergency generator set (EGS) engine specification sheet.

Replace the Proposed Fire Pump Engines with Larger Rated Horsepower Units

The Applicant is proposing to use fire pump engines that are substantially larger, i.e., HP rating, than the engines currently proposed. The current proposed engines are rated at 346 bhp, while the new proposed engines would be rated at 575-617 bhp (firing diesel fuel). The new engines, like the previous engines, are EPA Tier III compliant units. The new engines will have 6 cylinders, similar to the previously proposed engines, but due to the larger bhp rating, each unit will consume fuel at a rate of 29.2 gal/hr. No changes in operational or testing and maintenance hours are proposed. This proposed change will result in slight emissions increases and decreases on a pollutant-by-pollutant basis as shown in Table 6.

Table 6 Fire Pump Engine Emissions Comparison								
Pollutant	Current Engines (each)				Proposed New Engines (each)			
	g/bhp-hr	Lbs/hr*	Lbs/day	TPY	g/bhp-hr	Lbs/hr	Lbs/day	TPY
NO_x	2.8	2.14	2.14	0.055	2.64	3.55	3.55	0.092
CO	2.6	1.98	1.98	0.052	0.6	0.811	0.811	0.021
VOC	0.2	0.15	0.15	0.004	0.151	0.203	0.203	0.005
SO_x	0.002	0.002	0.002	0.00005	-	0.0060	0.0060	0.0002
PM10/2.5	0.15	0.11	0.11	0.003	0.09	0.122	0.122	0.003
*Emissions shown for 60 minutes per test. Actual testing (as reflected in the modeling) will be each of these engines run for a maximum of 30 minutes in any given test hour and per test day. 52 hrs/yr/engine								

The Applicant wishes to point out that the emissions and modeling for the proposed changes are based on the largest engine in the category, i.e., 617 bhp (UFAD88). Any of the engines in the classes UFADN0, UFADP0, and UFAD88 are suitable for use for the facility fire pump systems, and the Applicant may actually use the slightly smaller engines, i.e., 542-575 bhp models.

Use of Tier III engines represents current BACT, and the original BACT determination is still considered valid.

Attachment 3 contains the new fire pump engine specification sheets.

Modify the Cooling Towers to Incorporate a Change in Manufacturer

The current proposed cooling towers are six (6) cell towers rated at 90,000 gpm, with drift eliminators rated at 0.0005%. The current design is an “induced draft-counter flow” type. The towers were evaluated for particulate matter emissions based upon a final TDS of 9,968 ppmw (mg/l). Particulate matter emissions from each tower were estimated as follows:

- 2.24 lbs/hr
- 35.87 lbs/day
- 6.55 tons/yr

The Applicant is proposing to change the supplier/manufacturer of the cooling towers, with no other proposed changes to design, operation, or emissions.

The proposed changes represent a continuation of the current BACT determination.

Table 7 presents the revised project emissions. The values incorporate the proposed modifications discussed above.

Table 7 Revised Project Emissions Estimates, 2 Plant Totals					
Parameter	**NOx**	**CO**	**VOC**	**SOx**	**PM10/2.5**
Lbs/day	71.44	35.34	61.85	0.074	74.0
Tons/yr	1.86	0.96	9.93	0.002	13.16
CO_2e emissions remain well below the PSD Tailoring rule limit for new sources, i.e., <100,000 tpy.					

Conclusion

A review of the device and process specific emissions presented above results in the following conclusions:

- No nonattainment pollutant is emitted in excess of 25 tons per year from the facility per Section (A)(3), therefore BACT is not required for each new permit unit.
- Each of the emergency electric generators (diesel engines) will emit NO_x at a rate of 30.91 lbs/hr and 30.91 lbs/day. Each of the firepumps will emit NO_x at a rate of 3.55 lbs/hr and 3.5 lbs/day. BACT for NO_x would be required on the emergency electric generators, and the applicant believes that data presented to date indicates that these engines meet the MDAQMD BACT requirements, NSPS requirements, as well as CARB and EPA Tiered emissions standards.
- HTF system components, as listed in Attachment 1 will emit VOC at a rate of 24.76 lbs/day per plant. BACT for these field components is based upon the component design and maintaining the components (seals, valves, flanges, etc) in a leak free condition, etc. through an inspection/maintenance program.
- The HTF ullage system is anticipated to have maximum VOC emissions on the order of 4.34 lbs/day per plant. As such BACT is not triggered for this system/process.

As such, BACT is not triggered for the HTF ullage system under the MDAQMD NSR rules, therefore the applicant believes that the presently designed system of VOC controls for the ullage system is sufficient for purposes of controlling VOC emissions to the maximum extent possible considering the design of the project.

Overall, the proposed project will result in the following net increases and/or decreases in project emissions over the existing permitted limits as shown in Table 8.

Table 8 Existing and Revised Project Emissions Estimates, TPY					
	NOx	**CO**	**VOC**	**SOx**	**PM10/2.5**
Existing (CEC SSA Emissions)	2.96	2.08	12.92	0.03	13.47
Revised	1.86	0.96	9.93	0.002	13.16

+Increases -Decreases	-1.1	-1.12	-2.27	-0.028	-0.31
CO_2e emissions remain well below the PSD Tailoring rule limit for new sources, i.e., <100,000 tpy.					

Affected Environment (Revised)

Project Location

The proposed Project site is located in western San Bernardino County, east of the Kern County line, approximately 18 miles west-northwest of Barstow, California. The site is a mix of open desert and agricultural land, located in the western desert region of the county. The Four Corners area (intersection of Hwy 58 and Hwy 395) lies approximately 11 miles south-southwest of the project site. The site is flat, gently rising in elevation from the northeast to the west and southwest, with an elevation of approximately 2,070 feet above mean sea level (amsl). Terrain heights in excess of the site elevation are encountered within one mile to the south and west, and within two to three miles to the north and east. The site lies adjacent to and on the southwest side of the Harper Lake depression which has a mean elevation of approximately 2,017 feet amsl.

Climate and Meteorology

The proposed site west-northwest of Barstow, California, within the western portion of San Bernardino County, experiences the following climate and meteorology patterns.

The Mojave Desert Air Basin (MDAB) is an assemblage of mountain ranges interspersed with long broad valleys that often contain dry lakes. Many of the lower mountains which exist in this vast terrain rise from 1,000 to 4,000 feet above the valley floor. Prevailing winds in the MDAB are out of the west and southwest. These prevailing winds are due to the proximity of the MDAB to coastal and central regions and the blocking nature of the Sierra Nevada Mountains to the north. Air masses pushed onshore in southern California by differential heating are channeled through the MDAB. The MDAB is separated from the southern California coastal and central California valley regions by mountains (highest elevation approximately 10,000 feet), whose passes form the main channels for these air masses. The Antelope Valley is bordered in the northwest by the Tehachapi Mountains, separated from the Sierra Nevada Mountains in the north by the Tehachapi Pass (3,800 ft elevation). The Antelope Valley is bordered in the south by the San Gabriel Mountains, bisected by Soledad Canyon (3,300 ft). The Mojave Desert is bordered in the southwest by the San Bernardino Mountains, separated from the San Gabriels by the Cajon Pass (4,200 ft). A lesser channel lies between the San Bernardino Mountains and the Little San Bernardino Mountains (the Morongo Valley).

The Palo Verde Valley portion of the Mojave Desert lies in the low desert, at the eastern end of a series of valleys (notably the Coachella Valley) whose primary channel is the San Gorgonio Pass (2,300 ft) between the San Bernardino and San Jacinto Mountains.

During the summer, the MDAB is generally influenced by a Pacific Subtropical High cell that sits off the coast, inhibiting cloud formation and encouraging daytime solar heating. The MDAB is rarely influenced by cold air masses moving south from Canada and Alaska, as these frontal systems are weak and diffuse by the time the reach the desert. Most desert moisture arrives from infrequent warm, moist and unstable air masses from the south. The MDAB averages between three and seven inches of precipitation per year (from 16 to 30 days with at least 0.01 inches of precipitation). The MDAB is classified as a dry-hot desert climate (BWh), with portions classified as dry-very hot desert (BWhh), to indicate at least three months have maximum average temperatures over 100.4° F.

The climatic pattern for the Project region is a typical desert climate within the Mediterranean climate classification. The warmest month for the region is typically July, with the coldest month being December. The month with the highest precipitation is usually February. The western Mojave Desert region experiences a large number of days each year with sunshine, generally 345+ days per year. The region also traditionally experiences excellent visibility, i.e., greater than 10 miles or more 95 percent of the time.
Representative climatic data for the Project area was derived from the Barstow Fire Station (#040521), period of record 5/1/1980 to 3/31/2013. A summary of data from this site indicates the following:

- Average maximum temperature: 80.2°F
- Average minimum temperature: 50.5°F
- Highest mean maximum temperature: 106.2°F
- Lowest mean minimum temperature: 26°F
- Mean annual precipitation: 4.33 inches (in.)

Air Quality Standards and Background Air Quality Values

Air quality is determined primarily by the type and amount of pollutants emitted into the atmosphere, the nature of the emitting source, the topography of the air basin, and the local meteorological conditions. In the Project area, inversions and light winds can result in conditions for pollutants to accumulate in the region.

Each federal or state ambient air quality standard (AAQS) is comprised of two basic elements: (1) a numerical limit expressed as an allowable concentration, and (2) an averaging time which specifies the period over which the concentration value is to be measured. Table 9 presents the current federal and state AAQS.

Table 9 State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Ozone	1-hr	0.09 ppm (180 µg/m^3)	-
	8-hr	0.070 ppm (137 µg/m^3)	0.075 ppm (147 µg/m^3) (3-year average of annual 4th-highest daily maximum)
Carbon Monoxide	8-hr	9.0 ppm (10,000 µg/m^3)	9 ppm (10,000 µg/m^3)
	1-hr	20 ppm (23,000 µg/m^3)	35 ppm (40,000 µg/m^3)

Each federal or state ambient air quality standard (AAQS) is comprised of two basic elements: (1) a numerical limit expressed as an allowable concentration, and (2) an averaging time which specifies the period over which the concentration value is to be measured. Table 9 presents the current federal and state AAQS.

Table 9 State and Federal Ambient Air Quality Standards

Pollutant	**Averaging Time**	**California Standards Concentration**	**National Standards Concentration**
Nitrogen dioxide	Annual Average	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)
	1-hr	0.18 ppm (339 µg/m^3)	100 ppb (188 µg/m^3) (3-yr average of 98th percentiles)
Sulfur dioxide			
	24-hr	0.04 ppm (105 µg/m^3)	-
	3-hr	-	0.5 ppm (1,300 µg/m^3)
	1-hr	0.25 ppm (655 µg/m^3)	75 ppb (196 µg/m^3) (3-yr average of 99th percentiles)
Respirable particulate matter (10 micron)	24-hr	50 µg/m^3	150 µg/m^3
	Annual Arithmetic Mean	20 µg/m^3	-
Fine particulate matter (2.5 micron)	Annual Arithmetic Mean	12 µg/m^3	12.0 µg/m^3 (3-yr average)
	24-hr	-	35 µg/m^3 (3-yr average of 98th percentiles)
Sulfates	24-hr	25 µg/m^3	-
Lead	30-day	1.5 µg/m^3	-
	Rolling 3 Month Avg.	-	0.15 µg/m^3

µg/m^3 -- micrograms per cubic meter
ppm—parts per million
Source: CARB website, table updated 6/4/13

The nearest criteria pollutant air quality monitoring sites to the proposed Project site would be the stations located at Lancaster, Mojave, Victorville, and Barstow. Table 10 presents the MDAQMD attainment status and ambient monitoring data for these sites for the most recent three-year period are summarized in Table 11. Data from these sites are estimated to present a reasonable representation of background air quality for the Project site and impact area. Sulfur dioxide data was derived from the Victorville and Trona sites (the only sites in the regional area). It should be noted that the attainment and non-attainment status of the basin has not changed since the project from the date of the final commission decision in September, 2010.

Table 10 MDAQMD Attainment Status Table

Pollutant	Averaging Time	Federal Status	State Status
Ozone	1-hr	-	NA

Ozone	8-hr	NA	NA
CO	All	UNC/ATT	ATT
SO_2	All	UNC/ATT	ATT
NO_2	All	UNC/ATT	ATT
PM_{10}	All	NA	NA
$PM_{2.5}$	All	UNC/ATT	NA

ATT -- attainment
NA—non-attainment
UNC/ATT-unclassifed-attainment
Source: CARB AQ Status Maps, website, 7/13.

Table 11 Monitoring Data Summary (Highest Monitored Values)

Pollutant	Site	Avg. Time	2010	2011	2012
Ozone, ppm	Victorville	1-hr	0.111	0.098	0.111
		8-hr	0.092	0.085	0.094
	Barstow	1-hr	0.097	0.093	0.090
		8-hr	0.078	0.083	0.084
PM_{10}, µg/m^3	Lancaster	24-hr	nd	nd	nd
		Annual	nd	nd	nd
	Mojave	24-hr	nd	nd	nd
		Annual	nd	nd	nd
	Victorville	24-hr	40/47.7	34/81.0	40/43.0
		Annual	18.7	20.2	N/A
	Barstow	24-hr	35/35.0	96/43.0	39/39.0
		Annual	N/A	21.5	19.2
$PM_{2.5}$, µg/m^3 (2005-2010)	Lancaster	24-hr	nd	nd	nd
		Annual	nd	nd	nd
	Mojave	24-hr	nd	nd	nd
		Annual	nd	nd	nd
	Victorville	24-hr	16	17	15
		Annual	8.6/8.5	9.3/8.9	7.6/7.2
	Barstow	24-hr	nd	nd	nd
		Annual	nd	nd	nd
CO, ppm	Lancaster	1-hr	nd	nd	nd
		8-hr	nd	nd	nd
	Mojave	1-hr	nd	nd	nd
		8-hr	nd	nd	nd
	Victorville	1-hr	15.9	1.9	2.1
		8-hr	5.2	1.5	1.8
	Barstow	1-hr	1.3	4.4	0.9
		8-hr	0.9	1.4	0.7
NO_2, ppm	Lancaster	1-hr	nd	nd	nd
		Annual	nd	nd	nd
	Trona	1-hr	nd	nd	nd
		Annual	nd	nd	nd

	Victorville	1-hr	0.137/0.065	0.075/0.060	0.056/0.050
		Annual	0.015	0.015	0.013
	Barstow	1-hr	0.062/0.058	0.077/0.062	0.146/0.096
		Annual	0.017	0.017	0.017
SO_2, ppm (2009-2011)	Victorville	1-hr	0.008	0.052	0.013
		24-hr	0.006	0.007	0.007
	Trona	1-hr	0.011	0.010	0.014
		24-hr	0.003	0.003	0.006
	Lancaster	1-hr	nd	nd	nd
		24-hr	nd	nd	nd
	Barstow	1-hr	nd	nd	nd
		24-hr	nd	nd	nd

Sources: CARB ADAM database (most values) and USEPA AIRS database.
Cells with 2 values, e.g., **/** are the state/federal design values respectively.
NO_2 1-hour federal values are the 98^{th} percentiles.
PM2.5 24-hour federal values are the 98^{th} percentiles.

Table 12 presents the revised background values for the years 2010 through 2012.

Table 12 Revised Background Air Quality Values (2010-2012)

Pollutant and Averaging Time	**Background Value, μg/m^3**
PM_{10} – 24-hr	96/81
PM_{10} – Annual	21.5
$PM_{2.5}$ – 24-hr	16.0
$PM_{2.5}$ – Annual	8.2
CO – 1-hr	18209
CO – 8-hr	5955
NO_2 – 1-hr	275/135
NO_2 – Annual	32.0
SO_2 – 1-hr	136
SO_2 – 3-hr	136
SO_2 – 24-hr	18.4

High values for all years, all applicable stations.
NO_2 modeling was conducted using concurrent background values.

<u>Impact Analysis of the Proposed Modifications</u>

Changes in Equipment Location and Equipment Types

The proposed changes in the facility design and equipment were assessed to determine the magnitude of air quality impacts for comparisons with State and federal ambient air quality standards. Manufacturer specifications for the newly proposed emergency generators and firepumps are summarized below. The emergency equipment will be limited to testing of up to 30 minutes/day and 30 minutes/day using low-sulfur (15 ppm) diesel fuel. The air quality modeling shows that all engines can be tested simultaneously and the height of the emergency generator stacks can be reduced to 30 feet above grade level (firepump stacks remain unchanged at 20 feet above grade level). The modeled stack parameters and emissions for the facility equipment are shown in Table 13. Included in Table 13 are the mobile source emissions for onsite equipment (and fugitive dust for PM10/PM2.5), which were modeled as area sources. The mobile equipment was also modeled in the revised health risk assessment to include diesel particulate matter.

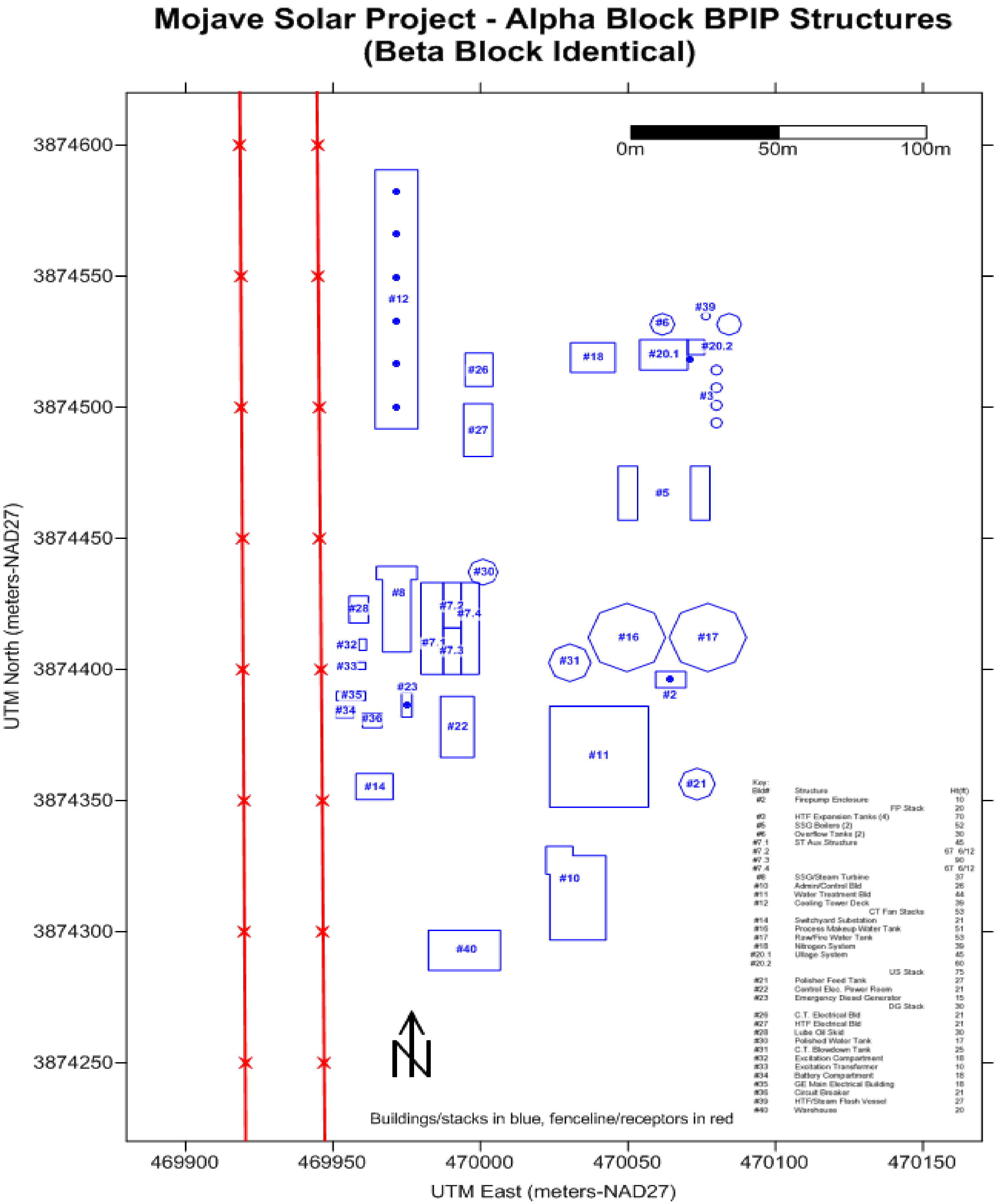
Changes in Modeling

The air quality modeling analyses for the emergency equipment were performed as closely as possible to the original analyses. The original receptor grids and 2001-2004 Daggett meteorological data were used with the same USEPA model, AERMOD (Version 12345). With the amendment, there are no changes to the existing project facility boundary or fence line. However, changes in the latest version of AERMOD as well as recent modeling guidance for assessing compliance with the 1-hour NO_2 National Ambient Air Quality Standard (NAAQS) issued by the California Air Pollution Control Officers Association (CAPCOA) Engineering Managers (*"Modeling Compliance of The Federal 1-Hour NO_2 NAAQS, October 27, 2011)* required some revisions in the modeling analyses.

First, the changes to the facility general arrangement required a re-analysis of building dimensions using the most recent version of BPIP-PRIME (Version 04274). BPIP-PRIME generates the wind-direction specific building dimension data for input into AERMOD. BPIP-PRIME's use is required as all of the stack heights for the proposed amendment will not be Good Engineering Practice (GEP) height (the greater of 65 meters or the formula stack height). Figure 1 presents the revised building and stack locations for the Alpha and Beta Power Blocks. It should be noted that the equipment and building dimension layouts are identical for each power block.

Second, the latest version of AERMOD (version 12345) was used, which requires a new and slightly different meteorological data format from the original modeling analyses. Therefore, the 2001-2004 Daggett surface data were downloaded from the National Climatic Data Center (NCDC) Integrated Surface Data/Integrated Surface Hour (ISD/ISH) ftp website and reprocessed with the latest version of AERMET (version 12345). The same concurrent upper air data as before, derived from radiosonde observations taken at Desert Rock, Nevada, were used, downloaded from the National Oceanic and Atmospheric Administration Earth System Research Laboratory (NOAA/ESRL) website. All other AERMOD inputs from the original AERMET processing were retained.

Figure 1


Mojave Solar Project - Alpha Block BPIP Structures
(Beta Block Identical)
0m
50m
100m
3874600
3874550
3874500
3874450
3874400
3874350
3874300
3874250
UTM North (meters-NAD27)
469900
469950
470000
470050
470100
470150
UTM East (meters-NAD27)
#12
#26
#27
#18
#6
#39
#20.1
#20.2
#3
#5
#30
#8
#28
#7.2
#7.4
#7.1
#7.3
#16
#17
#31
#32
#33
#2
#35
#34
#36
#23
#22
#11
#21
#14
#10
#40
N
Buildings/stacks in blue, fenceline/receptors in red
Key:
Bldg# Structure Ht(ft)
#2 Firepump Enclosure 10
FP Stack 20
#3 HTF Expansion Tanks (4) 70
#5 SSG Boilers (2) 52
#6 Overflow Tanks (2) 30
#7.1 ST Aux Structure 45
#7.2 67 6/12
#7.3 90
#7.4 67 6/12
#8 SSG/Steam Turbine 37
#10 Admin/Control Bld 26
#11 Water Treatment Bld 44
#12 Cooling Tower Deck 39
CT Fan Stacks 53
#14 Switchyard Substation 21
#16 Process Makeup Water Tank 51
#17 Raw/Fire Water Tank 53
#18 Nitrogen System 39
#20.1 Ullage System 45
#20.2 60
US Stack 75
#21 Polisher Feed Tank 27
#22 Control Elec. Power Room 21
#23 Emergency Diesel Generator 15
DG Stack 30
#26 C.T. Electrical Bld 21
#27 HTF Electrical Bld 21
#28 Lube Oil Skid 30
#30 Polished Water Tank 17
#31 C.T. Blowdown Tank 25
#32 Excitation Compartment 18
#33 Excitation Transformer 10
#34 Battery Compartment 18
#35 GE Main Electrical Building 18
#36 Circuit Breaker 21
#39 HTF/Steam Flash Vessel 27
#40 Warehouse 20

Lastly, the NO_2 modeling for determining compliance with the 1-hour NAAQS (submitted for the project in May 2010) had to be revised in accordance with the latest October 2011 CAPCOA guidance. NO_2 impacts in the revised analyses were modeled with AERMOD using the Ozone Limiting Method (OLM) to assess compliance with the 1-hour NAAQS, as well as the 1-hour California Ambient Air Quality Standards (CAAQS) and annual standards. Twenty percent (20%) of the NOx emissions were assumed to be NO_2 for all sources (CAPCOA-recommended value for diesel engines) with the AERMOD default 90% equilibrium ratio. Since the predominant facility emissions to be modeled are emergency equipment that only operate infrequently (i.e., tested 30 minutes each week), contributions to the 1-hour NAAQS design concentration are expected to be close to zero (see page 28 of the CAPCOA document). Therefore, a Tier 3 (PVMRM) Option 11 procedure was used (see pages 34-41 of the CAPCOA document) and, for assessing compliance with the 1-hour NAAQS, an average hourly emission rate (AER) was used, equal to the annual NOx emission rate (see page 29 of the CAPCOA document). Compliance with the 1-hour CAAQS was assessed using the maximum hourly emission rate consistent with the nature of the California standards. Just like the May 2010 project submittal, hourly ozone and NO_2 data, measured at Barstow and concurrent with the Daggett meteorological data, were used in the NO_2 modeling analyses. However, gap filling procedures had to be revised based on the latest CAPCOA document. Single missing hours were interpolated first (see page 19 of the CAPCOA document). Because a significant fraction of the days in the monitoring data had two consecutive missing hours each night (due to daily monitoring site QA procedures), missing data for two consecutive hours were also replaced with interpolated values. Because these missing data occur at the same time each night (i.e., were not random), data filling procedures described below would not be capable of filling in these missing data. Since these two-hour periods of missing data generally occur around midnight, the missing data replaced by interpolation would be expected to represent hours of relatively low concentrations anyway (see page 15 of the CAPCOA document). Finally, after interpolating missing data periods of one and two consecutive hours, any remaining missing data were filled in with the hourly maximum measurement for that month and year, which is listed as gap filling Simple Fill Method 5 and Complex Fill Option 1 (see page 20 of the CAPCOA document).

Changes in Modeled Impacts

Maximum short-term impacts from all four years of meteorological data modeled were used to assess compliance with all the CAAQS, since California state standards are never to be exceeded. The same maximum impacts were also used to conservatively assess compliance with the NAAQS for CO and PM10 (although high second-high [H2H] impacts could be considered for assessing compliance with these NAAQS). Maximum impacts were also used to conservatively assess compliance with the 1-hour and 3-hour SO_2 NAAQS (again, H2H impacts are acceptable for the 3-hour NAAQS, while the multi-year average of the annual 99th percentile daily maximum 1-hour impacts could be used for 1-hour SO_2 NAAQS). The multi-year average of the annual 98th percentile daily maximum impacts was used to assess compliance with the 1-hour NO_2 and 24-hour PM2.5 NAAQS. Maximum annual impacts were used to assess compliance with all annual NAAQS and CAAQS except the annual PM2.5 (for which the multi-year average of the annual impact was used).

Emissions due to facility operations were modeled for two different scenarios. First, facility impacts due to the stationary point sources alone (emergency generators, fire pumps, and cooling tower cells) were modeled as shown on Table 13. These modeled impacts are traditionally used in regular air permit applications to Air Pollution Control Districts, consistent with USEPA modeling requirements. Second, facility impacts were modeled for stationary point sources which were also combined with mobile source tailpipe and fugitive dust emissions as shown on Table 13. This style of analysis including mobile and fugitive sources is typical of an Environmental Impact Statement like the CEC Application for Certification (AFC). The mobile tailpipe and fugitive dust emissions were modeled as area sources with an effective height of 0.5 meters and an initial vertical sigma-z of 0.0 meters.

The results of the modeling analyses are presented in Tables 14 and 15. As noted on the two tables, there is very little difference between the two analyses with respect to overall concentrations, except for PM10 and PM2.5. This is because the mobile source tailpipe emissions contribute little to the overall maximum facility impacts. However, the fugitive dust emissions increase maximum 24-hour PM10 and PM2.5 impacts by 15% and 10%, respectively, and maximum annual PM10 and PM2.5 impacts by about 550% and 110%, respectively. Compliance with the NAAQS and CAAQS is shown in the revised analysis for all pollutants with background concentrations less that the standards – namely, NO_2, CO, SO_2, 24-hour PM10 NAAQS, and PM2.5. For PM10, the background concentrations already exceed the California 24-hour and annual standards even in the absence of impacts due to emissions from the project. Therefore, combined facility impacts with background exceed the PM10 CAAQS. Since project impacts for stationary point sources are less than the significant impact levels for annual averaging times for PM10 and PM2.5, the project amendment would not cause nor contribute to exceedances of the CAAQS, which are due solely to high background concentrations.

TABLE 13 MODELED STACK PARAMETERS AND EMISSION RATES								
Point and Area Emissions Sources[a]	**Release Height (m)**	**Stack Temp. (Kelvins)**	**Exhaust Velocity (m/s)**	**Stack Diameter (m)**	**Emission Rates (g/s or g/s/m^2)**			
					NOx	**SO_2**	**CO**	**PM10/ PM2.5**
Averaging Period: 1-hour for Normal Operating Conditions								
Mobile/Fugitive Sources	0.5	N/A	N/A	N/A	7.298E-9	1.303E-11	4.344E-9	–
Emergency Generator	9.144	753.2	104.16	0.3048	2.027E-0[b]	1.976E-3	1.108E-0	–
Fire Pump	6.096	723.7	39.66	0.2032	2.236E-1[b]	3.791E-4	5.111E-2	–
Averaging Period: 3-hours for Normal Operating Conditions								
Mobile/Fugitive Sources	0.5	N/A	N/A	N/A	–	1.303E-11	–	–
Emergency Generator	9.144	753.2	104.16	0.3048	–	6.587E-4	–	–
Fire Pump	6.096	723.7	39.66	0.2032	–	1.264E-4	–	–
Averaging Period: 8-hours for Normal Operating Conditions								
Mobile/Fugitive Sources	0.5	N/A	N/A	N/A	–	–	4.344E-9	–
Emergency Generator	9.144	753.2	104.16	0.3048	–	–	1.385E-1	–
Fire Pump	6.096	723.7	39.66	0.2032	–	–	6.389E-3	–
Averaging Period: 24-hours for Normal Operating Conditions								
Mobile/Fugitive Sources	0.5	N/A	N/A	N/A	–	1.303E-11	–	8.128E-8/ 1.786E-8
Emergency Generator	9.144	753.2	104.16	0.3048	–	8.234E-5	–	2.639E-3
Fire Pump	6.096	723.7	39.66	0.2032	–	1.580E-5	–	3.194E-4
Cooling Tower	15.545	296.0	6.66	9.1440	–	–	–	3.139E-2
Averaging Period: Annual for Normal Operating Conditions								
Mobile/Fugitive Sources	0.5	N/A	N/A	N/A	7.298E-9	–	–	8.128E-8/ 1.786E-8
Emergency Generator	9.144	753.2	104.16	0.3048	1.203E-2	–	–	3.760E-4
Fire Pump	6.096	723.7	39.66	0.2032	1.327E-3	–	–	4.551E-5
Cooling Tower	15.545	300.3	9.41	9.1440	–	–	–	3.139E-2

[a] Each emergency generator, firepump, and cooling tower cell. Cooling tower flow rates and temperatures represent winter conditions for 24-hour impacts (worst-case conditions) and average ambient conditions for annual impacts.
[b] For assessing compliance with 1-hour NAAQS, the Average Hourly Emission Rate (AER) equal to the annual emission rate was used for emergency equipment tested only intermittently consistent with the CAPCOA document.

TABLE 14 AIR QUALITY IMPACT SUMMARY FOR NORMAL OPERATING CONDITIONS FOR STATIONARY POINT SOURCES

Pollutant	Avg. Period	Maximum Concentration (μg/m³)	Background (μg/m³)	Total (μg/m³)	Significant Impact Level (μg/m³)	Ambient Air Quality CAAQS/NAAQS	
						(μg/m³)	(μg/m³)
NO_2[a]	1-hr Max	-	-	305.2	19	339	-
	1-hr 98th%	-	-	152.3	7.5	-	188
	Annual	-	-	47.7	1	57	100
PM10	24-hr	8.16	96/81	104/89	5	50	150
	Annual	0.27	21.5	21.8	1	20	-
PM2.5[b]	24- hr	2.63	16.0	18.6	1.2	-	35
	Annual	0.29	9.3	9.6	0.3	12	-
		0.27	8.2	8.5		-	15.0
CO	1- hr	187.5	18,209	18,397	2,000	23,000	40,000
	8- hr	6.85	5,955	5,962	500	10,000	10,000
SO_2	1- hr	0.36	136	136.4	7.8	655	196
	3- hr	0.06	136	136.1	25	-	1,300
	24- hr	0.003	18.4	18.4	5	105	-

[a] NO_2 1-hour and annual impacts are evaluated using the Ozone Limiting Method (OLM) with concurrent 1-hour ozone and NO_2 concentrations from the Barstow monitoring site. NO_2 "1-hr Max" and "Annual" impacts are the maximum impacts from the entire four year period and are used to assess compliance with the 1-hour CAAQS and annual NAAQS/CAAQS. NO_2 "1-hr 98th%" impact is the maximum four-year average concentration of the 8th highest (98th percentile) annual daily maximum 1-hour concentrations. All impacts were evaluated by AERMOD after including concurrent 1-hour NO_2 background concentrations from the Barstow monitoring site, so facility impacts and background concentrations are not presented separately.
[b] PM2.5 "24-hr" impact is the maximum four-year average concentration of the 8th highest (98th percentile) annual 24-hour concentrations. PM2.5 "Annual" impacts are the maximum annual impact for the CAAQS assessment and the maximum four-year average of the annual average concentrations for the NAAQS assessment.

TABLE 15 AIR QUALITY IMPACT SUMMARY FOR NORMAL OPERATING CONDITIONS FOR STATIONARY POINT AND MOBILE/FUGITIVE SOURCES							
Pollutant	**Avg. Period**	**Maximum Concentration ($\mu g/m^3$)**	**Background ($\mu g/m^3$)**	**Total ($\mu g/m^3$)**	**Significant Impact Level ($\mu g/m^3$)**	**Ambient Air Quality CAAQS/NAAQS ($\mu g/m^3$)**	**($\mu g/m^3$)**
NO_2[a]	1-hr Max	-	-	305.2	19	339	-
	1-hr 98th%	-	-	152.5	7.5	-	188
	Annual	-	-	47.8	1	57	100
PM10	24-hr	9.34	96/81	105/90	5	50	150
	Annual	1.75	21.5	23.3	1	20	-
PM2.5[b]	24- hr	2.87	16.0	18.9	1.2	-	35
	Annual	0.60	9.3	9.9	0.3	12	-
		0.58	8.2	8.8		-	15.0
CO	1- hr	187.5	18209	18397	2000	23,000	40,000
	8- hr	6.92	5955	5962	500	10,000	10,000
SO_2	1- hr	0.36	136	136.4	7.8	655	196
	3- hr	0.06	136	136.1	25	-	1,300
	24- hr	0.003	18.4	18.4	5	105	-

[a] NO_2 1-hour and annual impacts are evaluated using the Ozone Limiting Method (OLM) with concurrent 1-hour ozone and NO_2 concentrations from the Barstow monitoring site. NO_2 "1-hr Max" and "Annual" impacts are the maximum impacts from the entire four year period and are used to assess compliance with the 1-hour CAAQS and annual NAAQS/CAAQS. NO_2 "1-hr 98th%" impact is the maximum four-year average concentration of the 8th highest (98th percentile) annual daily maximum 1-hour concentrations. All impacts were evaluated by AERMOD after including concurrent 1-hour NO_2 background concentrations from the Barstow monitoring site, so facility impacts and background concentrations are not presented separately.
[b] PM2.5 "24-hr" impact is the maximum four-year average concentration of the 8th highest (98th percentile) annual 24-hour concentrations. PM2.5 "Annual" impacts are the maximum annual impact for the CAAQS assessment and the maximum four-year average of the annual average concentrations for the NAAQS assessment.

Revised Health Risk Evaluation

A revised health risk evaluation was prepared for the proposed modified facility based upon revisions to the equipment locations and estimated emissions of air toxic and/or hazardous air pollutants. The risk evaluation incorporated the following facility changes:

- Deletion of the auxiliary boiler emissions
- Revisions (short-term increase in lb/hr but no increase in tpy) to the VOC control systems emissions
- Revisions (increase) to the fugitive emissions due to updated component counts

- Revisions to the emergency equipment emissions
- Revisions to stack parameters, i.e., heights, diameters, temperatures, flow rates, etc.
- Revisions to the site processes and equipment layout

The revised analysis also incorporated the emissions from mobile source activities occurring during operations, i.e., mirror washing equipment activities. No revisions were made for construction related activities as there are no proposed changes to the previously assessed construction related impacts.

Environmental consequences potentially associated with the operation of the project are potential human exposure to chemical substances emitted to the air. The human health risks potentially associated with these chemical substances were evaluated in a health risk analysis (HRA). The chemical substances potentially emitted to the air from the revised ullage system, cooling tower, diesel engines and other miscellaneous support systems, including fugitives are listed in Table 16. Maximum hourly emissions were used for calculating acute hazard index (HI) values, while annual emissions were used to calculate the cancer risk and chronic HI values.

Table 16 Chemical Substances Potentially Emitted to the Air From the Project

Criteria Pollutants	Noncriteria Pollutants (Toxic Pollutants)	
Particulate Matter	Diesel Particulate Matter	Toluene
Carbon Monoxide	Benzene	Biphenyl
Sulfur Oxides	Phenol	Diphenyl ether
Nitrogen Oxides	Manganese	Lead
Volatile Organic Compounds	Arsenic	Aluminum
Lead	Chromium	Cadmium
	Selenium	Zinc
	Mercury	Copper
	Silver	Nickel

Potential impacts associated with emissions of toxic pollutants to the air from the proposed Project were addressed in the revised HRA and was prepared using guidelines developed by OEHHA and CARB, as implemented in the latest version of the Hotspots Analysis and Reporting Program (HARP) model (Version 1.4f).

Public Health Impact Study Methods

Emissions of toxic pollutants potentially associated with the Project were estimated using emission factors approved by CARB and the U.S. Environmental Protection Agency (EPA). Concentrations of these pollutants in air potentially associated with Project emissions were estimated using the HARP dispersion modeling module. Modeling allows the estimation of both short-term and long-term average concentrations in air for use in a HRA, accounting for site-specific terrain and meteorological conditions. Health risks potentially associated with the estimated concentrations of pollutants in air were characterized in terms of excess lifetime cancer risks (for carcinogenic substances), or comparison with reference exposure levels for non-cancer health effects (for non-carcinogenic substances).

Health risks were evaluated for a hypothetical maximum exposed individual (MEI) located at the maximum impact receptor (MIR). The hypothetical MEI is an individual assumed to be located at the MIR location, which is assumed (for purposes of this worst-case analysis) to be a residential receptor where the highest concentrations of air pollutants associated with Project emissions are predicted to occur, based on the air dispersion modeling. Human health risks associated with emissions from the proposed Project are unlikely to be higher at any other location than at the location of the MIR. If there is no significant impact associated with concentrations in air at the MIR location, it is unlikely that there would be significant impacts in any location in the vicinity of the Project. The highest off-site concentration location represents the MIR/MEI.

Health risks potentially associated with concentrations of carcinogenic air pollutants were calculated as estimated excess lifetime cancer risks. The excess lifetime cancer risk for a pollutant is estimated as the product of the concentration in air and a unit risk value. The unit risk value is defined as the estimated probability of a person contracting cancer as a result of constant exposure to an ambient concentration of 1 microgram per cubic meter ($\mu g/m^3$) over a 70-year lifetime. In other words, it represents the increased cancer risk associated with continuous exposure to a concentration in air over a 70-year lifetime. Evaluation of potential non-cancer health effects from exposure to short-term and long-term concentrations in air was performed by comparing modeled concentrations in air with the RELs. A REL is a concentration in air at or below which no adverse health effects are anticipated. RELs are based on the most sensitive adverse effects reported in the medical and toxicological literature. Potential non-cancer effects were evaluated by calculating a ratio of the modeled concentration in air and the REL. This ratio is referred to as a hazard quotient. The unit risk values and RELs used to characterize health risks associated with modeled concentrations in air were obtained from the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* (CARB, 2012). The revisions to the emissions of toxic and/or hazardous pollutants for the various processes were presented above.

Characterization of Risks from Toxic Air Pollutants

The excess lifetime cancer risk associated with concentrations in air estimated for the Project MIR location is calculated to be 6.77×10^{-7}. Excess lifetime cancer risks less than 10×10^{-6} (with T-BACT) are unlikely to represent significant public health impacts that require additional controls of facility emissions. Risks higher than 1×10^{-6} may or may not be of concern, depending upon several factors. These include the conservatism of assumptions used in risk estimation, size of the potentially exposed population, and toxicity of the risk-driving chemicals. Health effects risk thresholds are listed in Table 17. Risks associated with pollutants potentially emitted from the Project are presented in Table 18. As described previously, human health risks associated with emissions from the proposed Project are unlikely to be higher at any other location than at the location of the MIR. If there is no significant impact associated with concentrations in air at the MIR location, it is unlikely there would be significant impacts in any other location in the vicinity of the Project.

Table 17 Significant Health Effect Threshold Levels for MDAQMD	
Risk Category	**Risk Threshold**
Cancer Risk	>1.0 x 10^{-6} without TBACT >10 x 10^{-6} with TBACT
Chronic Hazard Index	>1.0
Acute Hazard Index	>1.0
Cancer Burden	>0.5

These results of the revised analyses indicate that the facility risk values remain well below the significance thresholds for both the MDAQMD and the State of California.

Table 16 Revised Health Risk Assessment Summary					
Receptor Priority	Receptor #	UTMs	Cancer Risk	Chronic HI	Acute HI
1st High	131	469945, 3874550	6.77E-7	0.0309	0.0096
2nd High	130	469945, 3874500	6.18E-7	0.0271	0.0103
3rd High	128	469946, 3874400	5.86E-7	0.0054	0.0118
Acute 1st High	117	469920, 3874250	-	-	0.0131
Each of the receptors noted above are assumed to be residential in nature, regardless of actual site occupation, for a 70 year exposure.					

The acute and chronic non-cancer hazard quotients for all target organs fall well below 1.0. As described previously, a hazard quotient less than 1.0 is unlikely to represent significant impact to public health. If there is no significant impact associated with concentrations in air at the MIR location, it is unlikely there would be significant impacts in any other location in the vicinity of the Project.

Detailed risk and hazard values are provided in the HARP output presented in the attached DVD. No specific health related studies were identified which pertain to the local Project area for any identified toxic air pollutant or identified specific population. The various MATES studies prepared by the SCAQMD are targeted at the major district urban areas, not the eastern desert regions where the project is located.

The estimates of excess lifetime cancer risks and non-cancer risks associated with chronic or acute exposures fall below thresholds used for regulating emissions of toxic pollutants to the air. Historically, exposure to any level of a carcinogen has been considered to have a finite risk of inducing cancer. In other words, there is no threshold for carcinogenicity. Since risks at low levels of exposure cannot be quantified directly by either animal or epidemiological studies, mathematical models have estimated such risks by extrapolation from high to low doses. This modeling procedure is designed to provide a highly conservative estimate of cancer risks based on the most sensitive species of laboratory animal for extrapolation to humans. In other words, the assumption is that humans are as sensitive as the most sensitive animal species. Therefore, the true risk is not likely to be higher than risks estimated using unit risk factors and is most likely lower, and could even be zero.

An excess lifetime cancer risk of 1×10^{-6} is typically used as a screening threshold of significance for potential exposure to carcinogenic substances in air. The excess cancer risk level of 1×10^{-6}, which has historically been judged to be an acceptable risk, originates from efforts by the Food and Drug Administration (FDA) to use quantitative HRA for regulating carcinogens in food additives in light of the zero tolerance provision of the Delany Amendment (Hutt, 1985). The associated dose, known as a “virtually safe dose,” has become a standard used by many policy makers and the lay public for evaluating cancer risks. However, a study of regulatory actions pertaining to carcinogens found that an acceptable risk level can often be determined on a case-by-case basis. This analysis of 132 regulatory decisions found that regulatory action was not taken to control estimated risks below 1×10^{-6} (one in a million), which are called de minimis risks. De minimis risks are historically considered risks of no regulatory concern. Chemical exposures with risks above 4×10^{-3} (four in ten thousand), called “de manifestis” risks, were consistently regulated. “De manifestis” risks are typically risks of regulatory concern. The risks falling between these two extremes were regulated in some cases, but not in others (Travis et al, 1987).

The estimated lifetime cancer risks to the maximally exposed individual located at the Project MIR are well below the 10×10^{-6} significance level (with T-BACT). These risk estimates were calculated using assumptions that are highly health conservative. Evaluation of the risks associated with the Project emissions should consider that the conservatism in the assumptions and methods used in risk estimation considerably overstate the risks from Project emissions. Based on the results of this HRA, there are no significant public health impacts anticipated from emissions of toxic pollutant to the air from the Project.

Operation Odors

The revised Project is not expected to emit any substances that could cause odors.

Summary of Impacts

Results from the revised air toxics HRA based on emissions modeling indicate there will be no significant incremental public health risks from construction or operation of the Project. Results from the revised criteria pollutant modeling for routine operations indicate potential ambient concentrations of NO_2, CO, SO_2, and PM10/PM2.5 will not significantly impact air quality. Potential concentrations are below the Federal and California standards established to protect public health, including the more sensitive members of the population.

Revised Cumulative Impacts

The HRA for the Project indicates the maximum cancer risk will be approximately 6.77×10^{-7}, versus the MDAQMD significance threshold of >10 in one million at the point of maximum exposure to air toxics from power plant emissions utilizing TBACT. This risk level is considered to be insignificant. Non-cancer chronic and acute effects will also be less than significant. A cumulative risk impact analysis is not proposed at this time because of the following:

Low project operational emissions levels of air toxic substances.

Insignificant risk resulting from project operations.

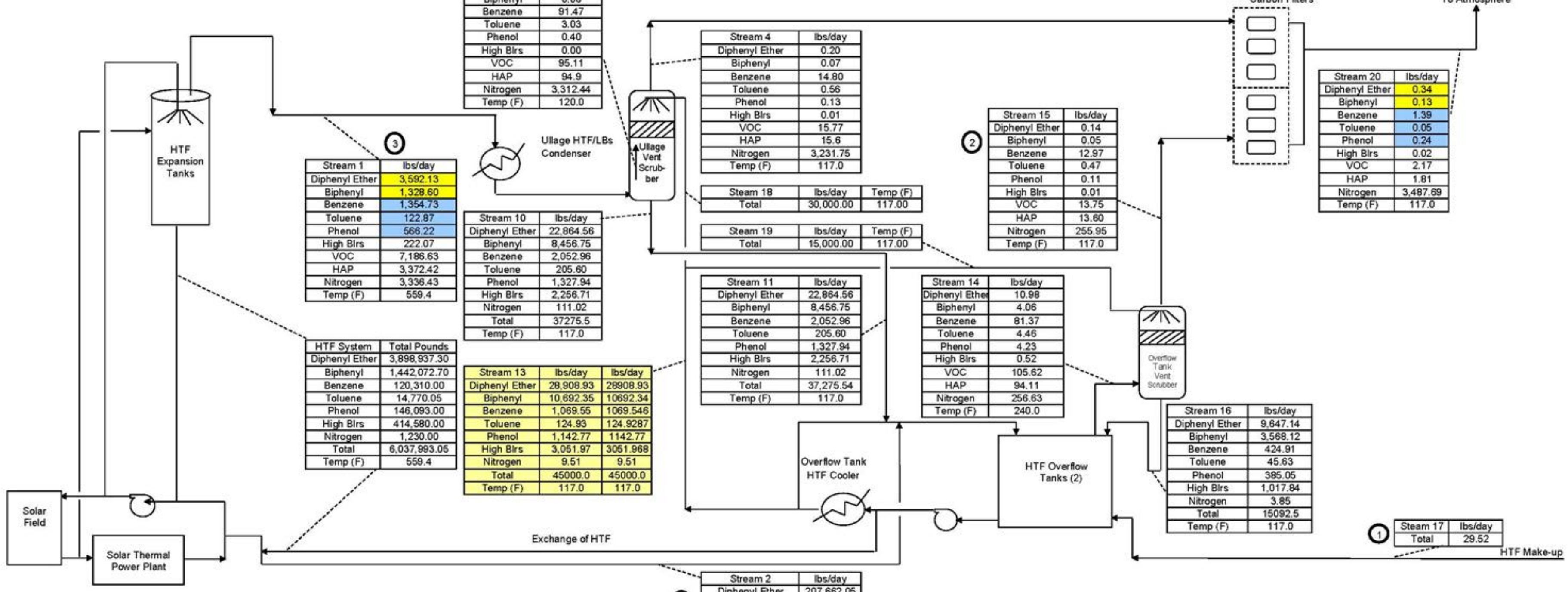
Lack of an established background or baseline risk value for the Project impact area. The toxics monitoring data compiled by CARB is designed to provide air quality data in support of general population exposures. The data do not provide information on localized impacts, often referred to as near-source or neighborhood exposures.

The CARB toxics air contaminant monitoring network does not include any monitoring sites within the project impact region, *i.e.*, the sites currently operating in the most recent 3 to 5 period are confined to the major urban areas. The closest monitoring sites would be those located in the South Coast AQMD (Los Angeles urban area). These sites would not represent ambient concentrations of toxic substances in remote desert areas such as the Project site.

CEC staff indicates, based on their review of numerous modeling studies, that unless a significantly sized source of HAPs is located within 0.5 miles of the proposed new source, it is highly unlikely that the cumulative emissions of the sources will result in any significant health related impacts. There are no significant sources (existing or proposed) of HAPs within 0.5 miles of the project site, therefore a cumulative analysis of health risk impacts is not warranted at this time.

ATTACHMENT 1 – HTF ULLAGE SYSTEM PROCESS FLOW BLOCK DIAGRAM

(CONFIDENTIAL INFORMATION)



Overall HTF Recovery	99.99	%
Overall LB Recovery	99.92	%

Stream 1	lbs/day
Diphenyl Ether	3,592.13
Biphenyl	1,328.60
Benzene	1,354.73
Toluene	122.87
Phenol	566.22
High Blrs	222.07
VOC	7,186.63
HAP	3,372.42
Nitrogen	3,336.43
Temp (F)	559.4

HTF System	Total Pounds
Diphenyl Ether	3,898,937.30
Biphenyl	1,442,072.70
Benzene	120,310.00
Toluene	14,770.05
Phenol	146,093.00
High Blrs	414,580.00
Nitrogen	1,230.00
Total	6,037,993.05
Temp (F)	559.4

Stream 3	lbs/day
Diphenyl Ether	0.15
Biphenyl	0.06
Benzene	91.47
Toluene	3.03
Phenol	0.40
High Blrs	0.00
VOC	95.11
HAP	94.9
Nitrogen	3,312.44
Temp (F)	120.0

Stream 10	lbs/day
Diphenyl Ether	22,864.56
Biphenyl	8,456.75
Benzene	2,052.96
Toluene	205.60
Phenol	1,327.94
High Blrs	2,256.71
Nitrogen	111.02
Total	37275.5
Temp (F)	117.0

Stream 13	lbs/day	lbs/day
Diphenyl Ether	28,908.93	28908.93
Biphenyl	10,692.35	10692.34
Benzene	1,069.55	1069.546
Toluene	124.93	124.9287
Phenol	1,142.77	1142.77
High Blrs	3,051.97	3051.968
Nitrogen	9.51	9.51
Total	45000.0	45000.0
Temp (F)	117.0	117.0

Stream 4	lbs/day
Diphenyl Ether	0.20
Biphenyl	0.07
Benzene	14.80
Toluene	0.56
Phenol	0.13
High Blrs	0.01
VOC	15.77
HAP	15.6
Nitrogen	3,231.75
Temp (F)	117.0

Steam 18	lbs/day	Temp (F)
Total	30,000.00	117.00

Steam 19	lbs/day	Temp (F)
Total	15,000.00	117.00

Stream 11	lbs/day
Diphenyl Ether	22,864.56
Biphenyl	8,456.75
Benzene	2,052.96
Toluene	205.60
Phenol	1,327.94
High Blrs	2,256.71
Nitrogen	111.02
Total	37,275.54
Temp (F)	117.0

Stream 2	lbs/day
Diphenyl Ether	207,662.05
Biphenyl	76,806.51
Benzene	6,407.85
Toluene	786.67
Phenol	7,781.09
High Blrs	22,081.03
Nitrogen	65.51
Total	321590.7
Temp (F)	559.4

Stream 15	lbs/day
Diphenyl Ether	0.14
Biphenyl	0.05
Benzene	12.97
Toluene	0.47
Phenol	0.11
High Blrs	0.01
VOC	13.75
HAP	13.60
Nitrogen	255.95
Temp (F)	117.0

Stream 14	lbs/day
Diphenyl Ether	10.98
Biphenyl	4.06
Benzene	81.37
Toluene	4.46
Phenol	4.23
High Blrs	0.52
VOC	105.62
HAP	94.11
Nitrogen	256.63
Temp (F)	240.0

Stream 16	lbs/day
Diphenyl Ether	9,647.14
Biphenyl	3,568.12
Benzene	424.91
Toluene	45.63
Phenol	385.05
High Blrs	1,017.84
Nitrogen	3.85
Total	15092.5
Temp (F)	117.0

Stream 20	lbs/day
Diphenyl Ether	0.34
Biphenyl	0.13
Benzene	1.39
Toluene	0.05
Phenol	0.24
High Blrs	0.02
VOC	2.17
HAP	1.81
Nitrogen	3,487.69
Temp (F)	117.0

Steam 17	lbs/day
Total	29.52

Note 1: Stream 17 is HTF make-up to system.
Note 2: Occurs in 20 minutes.
Note 3: Occurs in 40 minutes.
Note 4: VOCs are comprised of Diphenyl Ether, Biphenyl, Benzene, Toluene, Phenol, and High Boilers.
Note 5: HAPs are comprised of Biphenyl, Benzene, Toluene, and Phenol.

Permit DESIGN (PFD)
Vent to Activated Carbon (AC)

Process Flow Block Diagram - Vent Scrubbing System - Mojave
FINAL VALUES FOR MOJAVE
PERMIT CASE

Process Flow Block Diagram - Vent Scrubbing System - Mojave
FINAL VALUES FOR MOJAVE
PERMIT CASE

Process Flow Block Diagram - Vent Scrubbing System - Mojave
FINAL VALUES FOR MOJAVE
PERMIT CASE

Process Flow Block Diagram - Vent Scrubbing System - Mojave
FINAL VALUES FOR MOJAVE
PERMIT CASE

HTF System Component Count and Fugitive Emissions Estimate 9/24/2013 1

Mojave Solar Project

Component	Single Plant Count #	Service	EF lb/hr/src	hrs/day	lbs/hr	lbs/day	lbs/yr	t
Valves								
Sealed Bellows/Flex Hoses	5063	Gas/Vapor & Lt. Liquid	0	24	0.000	0.000	0.000	
	0	Lt. Liquid	0	0	0.000	0.000	0.000	
Non-Bellows Sealed	373	Lt. Liquid	0.000555	16	0.207	3.312	1208.968	
		Hvy. Liquid	0.000019	8	0.007	0.057	20.694	
Pumps								
Sealess Type	0	Lt. Liquid	0	0	0.000	0.000	0.000	
Double Mech Seals or Equivalent	23	Lt. Liquid	0.00186	16	0.043	0.684	249.835	
		Hvy. Liquid	0.000053	8	0.001	0.010	3.559	
Single Mech Seal	0	Hvy. Liquid	0	0	0.000	0.000	0.000	
Compressors	0	Gas/Vapor	0	0	0.000	0.000	0.000	
Flanges/Connectors	515	Lt. Liquid	0.0000165	16	0.008	0.136	49.625	
		Hvy. Liquid	0.0000165	8	0.008	0.068	24.813	
PRVs	13	Gas	0.0985	16	1.281	20.488	7478.120	
	22	Hvy. Liquid	0.000019	8	0.000	0.003	1.221	
Process Drains	0	All	0	0	0.000	0.000	0.000	
Open-ended Lines	0	Lt. Liquid	0.003307	0	0.000	0.000	0.000	
Plants per Facility:	2		Single Plant Total		1.56	24.76	9036.83	
Operating Days/Yr:	365		Facility Total		3.11	49.52	18073.67	

Notes:

(1) The component counts listed above are the actual number of each component purchased as of 04/05/2013, with a 15%
margin.

(2) The Emission Factor (EF) values listed above and guidance for light liquid vs. heavy liquid came from the following sou
CEC, Supplemental Staff Assessment - Part B, Abengoa Mojave Solar, May 2010, 09-AFC-5, CEC-700-2010-003-SUPB.

(3) Flex Hoses per the mfg have zero emissions.

Fugitive Toxics/HAPs vapor:	Substance	MSDS % wt	wt frac	Single Plant lbs/hr	lbs/yr	Tw lbs/hr	
	benzene	18.9	0.189	0.29	1707.96	0.59	3
	phenol	7.9	0.079	0.12	713.91	0.25	1
	biphenyl	18.5	0.185	0.29	1671.81	0.58	3
	toluene	1.7	0.017	0.03	153.63	0.05	3
	diphenyl ether	50	0.5	0.78	4518.42	1.56	9
	dibenzofuran	3.1	0.031	0.05	280.14	0.10	5

(4) Decomposition data from HTF mfg MSDS (Solutia) and other related MSDS data.

(5) Fugitive emissions components are based on Expansion Vessels vapor stream compositions of the Aspen output scher

ATTACHMENT 2 – EMERGENCY GENERATOR MANUFACTURER SPECIFICATIONS

EXPECTED INTERNAL COMBUSTION ENGINE EMISSIONS

Liquid Fuel

Emergency Generator

Mfg:	Electra Molins	
Engine #:	16V4000G43	
kW:	2280	
BHP:	N/A	
RPM:	1800	
Fuel:	#2 Diesel	
Fuel Use:	152.19	Gph (1)
FuelHHV:	139000	Btu/gal
mmbtu/hr:	21.15	HHV

# of Identical Engines: 2

Stack Data

Height:	30	Ft.	9.144 meters
Diameter:	1	Ft.	0.3048 meters
Temp:	896	deg F	753.2 Kelvins
ACFM:	16103		104.16 m/s

input the mfg ACFM or calculate per Exhaust sheet)

Area:	0.785	Sq.Ft.
Velocity:	342	Ft/Sec
Max Daily Op Hrs:	1	
Max Annual Op Hrs:	52	

If the engines will operate less than an hour for purposes of testing, use the final emissions values on page 2.

Fuel Wt:	6.87	lbs/gal
Fuel S:	0.0015	% wt.
Fuel S:	0.10305	lbs/1000 gal
SO2:	0.2061	lbs/1000 gal

			Single Engine				***All Engines***			
EFs (g/kWh)		**g/s**	**Lb/Hr**	**Lb/Day**	**Lbs/Yr**	**Tons/Yr**	***Lb/Hr***	***Lb/Day***	***Lbs/Yr***	***Tons/Yr***
NOx	6.4	4.0533	32.17	32.17	1672.8	0.836	*64.34*	*64.34*	*3345.7*	*1.673*
CO	3.5	2.2167	17.59	17.59	914.8	0.457	*35.19*	*35.19*	*1829.7*	*0.915*
VOC	N/A		N/A	N/A	N/A	N/A	*N/A*	*N/A*	*N/A*	*N/A*
PM10	0.2	0.1267	1.01	1.01	52.3	0.026	*2.01*	*2.01*	*104.6*	*0.052*
SOx	NA	0.0040	0.031	0.031	1.63	0.0008	*0.063*	*0.063*	*3.26*	*0.0016*
	lbs/gal									
CO2	22.38		3406	3406	177113	89	*6812*	*6812*	*354225*	*177*
Methane	0.0003		0.05	0.05	2.37	0.001	*0.09*	*0.09*	*4.75*	*0.002*
N2O	0.0001		0.02	0.02	0.79	0.0004	*0.03*	*0.03*	*1.58*	*0.0008*
CO2e						88.7				*177.4*

Notes:

1. fuel consumption based on 208 g/kWh at 100% load
   Total NOx+HC emissions assumed to be NOx for modeling purposes.
2. PM10 equals PM2.5.
3. PM10 used in HRA to represent DPM emissions.
4. GHG EFs from CCAR General Protocol, June 2006.

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Max Daily Op Time:	0.5	hrs
Max Annual # Tests:	52	

		Single Engine				***All Engines***			
	g/s	**Lb/Hr**	**Lb/Day**	**Lbs/Yr**	**Tons/Yr**	***Lb/Hr***	***Lb/Day***	***Lbs/Yr***	***Tons/Yr***
NOx	2.0267	16.09	16.09	836.4	0.418	32.17	32.17	1672.8	0.836
CO	1.1083	8.80	8.80	457.4	0.229	17.59	17.59	914.8	0.457
VOC		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PM10	0.0633	0.50	0.50	26.1	0.013	1.01	1.01	52.3	0.026
SOx	0.0020	0.016	0.016	0.82	0.0004	0.031	0.031	1.63	0.0008
CO2		1703	1703	88556	44	3406	3406	177113	89
Methane		0.02	0.02	1.19	0.00	0.05	0.05	2.37	0.00
N2O		0.01	0.01	0.40	0.00	0.02	0.02	0.79	0.00
CO2e					44.35				88.70

ATTACHMENT 3 – FIRE PUMP MANUFACTURER SPECIFICATIONS

EXPECTED INTERNAL COMBUSTION ENGINE EMISSIONS

Liquid Fuel — # of Identical Engines: 2

Emergency Fire Pump

Mfg:	Clarke Firepump w/ John Deere Engine		Stack Data				
Engine #:	JX6H-UFADNO		Height:	20	Ft.	6.096	meters
kW:	460	*(J.Deere 1760rpm Emissions Data)*	Diameter:	0.6667	Ft.	0.2032	meters
BHP:	N/A		Temp:	843	deg F	723.7	Kelvins
RPM:	1760/2100		ACFM:	2725		39.66	m/s
Fuel:	#2 Diesel		input the mfg ACFM or calculate per Exhaust sheet)				
Fuel Use:	29.2	Gph (1)	Area:	0.349	Sq.Ft.		
FuelHHV:	139000	Btu/gal	Velocity:	130	Ft/Sec		
mmbtu/hr:	4.06	HHV	Max Daily Op Hrs:	1			
			Max Annual Op Hrs:	52			

If the engines will operate less than an hour for purposes of testing, use the final emissions values on page 2.

Fuel Wt:	6.87	lbs/gal
Fuel S:	0.0015	% wt.
Fuel S:	0.10305	lbs/1000 gal
SO2:	0.2061	lbs/1000 gal

			Single Engine				***All Engines***			
EFs (g/kWh)		**g/s**	**Lb/Hr**	**Lb/Day**	**Lbs/Yr**	**Tons/Yr**	***Lb/Hr***	***Lb/Day***	***Lbs/Yr***	***Tons/Yr***
NOx	3.5	0.4472	3.549	3.549	184.6	0.092	*7.099*	*7.099*	*369.1*	*0.185*
CO	0.8	0.1022	0.811	0.811	42.2	0.021	*1.623*	*1.623*	*84.4*	*0.042*
VOC	0.2		0.203	0.203	10.5	0.005	*0.406*	*0.406*	*21.1*	*0.011*
PM10	0.12	1.533E-2	0.122	0.122	6.3	0.003	*0.243*	*0.243*	*12.7*	*0.006*
SOx	NA	7.583E-4	0.0060	0.0060	0.31	0.0002	*0.0120*	*0.0120*	*0.63*	*0.0003*
	lbs/gal									
CO2	22.38		653	653	33982	16.99	*1307*	*1307*	*67964*	*33.98*
Methane	0.0003		0.01	0.01	0.46	0.0002	*0.02*	*0.02*	*0.91*	*0.0005*
N2O	0.0001		0.00	0.00	0.15	0.0001	*0.01*	*0.01*	*0.30*	*0.0002*
CO2e						17.0				*34.0*

Notes:

1. fuel consumption based on manufacturer's data

2. PM10 equals PM2.5.
3. PM10 used in HRA to represent DPM emissions.
4. GHG EFs from CCAR General Protocol, June 2006.

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Max Daily Op Time: 0.5 hrs

Max Annual # Tests: 52

		Single Engine				***All Engines***			
	g/s	**Lb/Hr**	**Lb/Day**	**Lbs/Yr**	**Tons/Yr**	***Lb/Hr***	***Lb/Day***	***Lbs/Yr***	***Tons/Yr***
NOx	0.2236	1.775	1.775	92.3	0.046	3.549	3.549	184.6	0.092
CO	0.0511	0.406	0.406	21.1	0.011	0.811	0.811	42.2	0.021
VOC		0.101	0.101	5.3	0.003	0.203	0.203	10.5	0.005
PM10	7.667E-3	0.061	0.061	3.2	0.002	0.122	0.122	6.3	0.003
SOx	3.791E-4	0.0030	0.0030	0.16	0.0001	0.0060	0.0060	0.31	0.0002
CO2		327	327	16991	8.50	653	653	33982	16.99
Methane		0.00	0.00	0.23	0.0001	0.01	0.01	0.46	0.0002
N2O		0.00	0.00	0.08	0.00004	0.00	0.00	0.15	0.00008
CO2e					8.51				17.02

ATTACHMENT 4 – PERMIT FORMS