TETRA TECH EC, INC.

DOCKET
09-AFC-8

DATE	MAY 18 2010
RECD.	MAY 18 2010

May 18, 2010

California Energy Commission
Docket No. 09-AFC-8
1516 9th St.
Sacramento, CA 95814

Genesis Solar Energy Project - Docket Number 09-AFC-8

Docket Clerk:

Enclosed for filing with this letter is one hard copy and one electronic copy of our ***Responses to Mojave Desert Air Quality Management District (MDAQMD) Requests for Additional Information for the Genesis Solar Energy Project.***

This document was sent to Mr. Richard Wales of the MDAQMD on May 17th, 2010.

Sincerely,

Tricia Bernhardt

Tricia Bernhardt
Project Manager/Tetra Tech EC

cc: Mike Monasmith /CEC Project Manager

143 Union Boulevard, Suite 1010, Lakewood, CO 80228-1875
Tel 303.988.2202 Fax 303.980.3539
www.tteci.com

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION FOR THE
GENESIS SOLAR ENERGY PROJECT

Docket No. 09-AFC-8

PROOF OF SERVICE
(Revised 5/12/10)

APPLICANT
Ryan O'Keefe, Vice President
Genesis Solar LLC
700 Universe Boulevard
Juno Beach, Florida 33408
E-mail service preferred
Ryan.okeefe@nexteraenergy.com

Scott Busa/Project Director
Meg Russel/Project Manager
Duane McCloud/Lead Engineer
NextEra Energy
700 Universe Boulvard
Juno Beach, FL 33408
Scott.Busa@nexteraenergy.com
Meg.Russell@nexteraenergy.com
Duane.mccloud@nexteraenergy.com
E-mail service preferred
Matt Handel/Vice President
Matt.Handel@nexteraenergy.com
Email service preferred
Kenny Stein,
Environmental Services Manager
Kenneth.Stein@nexteraenergy.com

Mike Pappalardo
Permitting Manager
3368 Videra Drive
Eugene, OR 97405
mike.pappalardo@nexteraenergy.com

Kerry Hattevik/Director
West Region Regulatory Affairs
829 Arlington Boulevard
El Cerrito, CA 94530
Kerry.Hattevik@nexteraenergy.com

APPLICANT'S CONSULTANTS
Tricia Bernhardt/Project Manager
Tetra Tech, EC
143 Union Boulevard, Ste 1010
Lakewood, CO 80228
Tricia.bernhardt@tteci.com

James Kimura, Project Engineer
Worley Parsons
2330 East Bidwell Street, Ste.150
Folsom, CA 95630
James.Kimura@WorleyParsons.com

COUNSEL FOR APPLICANT
Scott Galati
Galati & Blek, LLP
455 Capitol Mall, Ste. 350
Sacramento, CA 95814
sgalati@gb-llp.com

INTERESTED AGENCIES
California-ISO
e-recipient@caiso.com

Allison Shaffer, Project Manager
Bureau of Land Management
Palm Springs South Coast
Field Office
1201 Bird Center Drive
Palm Springs, CA 92262
Allison_Shaffer@blm.gov

INTERVENORS
California Unions for Reliable
Energy (CURE)
c/o: Tanya A. Gulesserian,
Rachael E. Koss,
Marc D. Joseph
Adams Broadwell Joesph
& Cardoza
601 Gateway Boulevard,
Ste 1000
South San Francisco, CA 94080
tgulesserian@adamsbroadwell.com
rkoss@adamsbroadwell.com

*Tom Budlong
5439 Soquel Drive
3216 Mandeville Cyn Rd.
Los Angeles, CA 90049-1016
tombudlong@roadrunner.com

Californians for Renewable
Energy, Inc. (CARE)
Michael E. Boyd, President
5439 Soquel Drive
Soquel, CA 95073-2659
michaelboyd@sbcglobal.net

OTHER
Alfredo Figueroa
424 North Carlton
Blythe, CA 92225
lacunadeaztlan@aol.com

ENERGY COMMISSION
JAMES D. BOYD
Commissioner and Presiding
Member
jboyd@energy.state.ca.us

ROBERT WEISENMILLER
Commissioner and Associate
Member
rweisenm@energy.state.ca.us

Kenneth Celli
Hearing Officer
kcelli@energy.state.ca.us

Mike Monasmith
Siting Project Manager
mmonasmi@energy.state.ca.us

Caryn Holmes
Staff Counsel
cholmes@energy.state.ca.us

Robin Mayer
Staff Counsel
rmayer@energy.state.ca.us

Jennifer Jennings
Public Adviser's Office
publicadviser@energy.state.ca.us

*indicates change

I, Tricia Bernhardt, declare that on May 17, 2010, I served and filed copies of the ***Responses to MDAQMD Requests for Additional Information for the Genesis Solar Energy Project*** dated May 17, 2010. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [http://ww.energy.ca.gov/sitingcases/genesis_solar].

The documents have been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

FOR SERVICE TO ALL OTHER PARTIES:

__x__ sent electronically to all email addresses on the Proof of Service list;

__x__ by personal delivery or by depositing in the United States mail at Sacramento, California with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses NOT marked "email preferred."

AND

FOR FILING WITH THE ENERGY COMMISSION:

__x__ sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (*preferred method*);

OR

______ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-8
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.

Original Signed By:

Tricia Bernhardt

Tricia Bernhardt

TETRA TECH EC, INC.

Mr. Richard T. Wales, AQE
Mojave Desert AQMD
14306 Park Ave.
Victorville, CA. 92392

May 14, 2010

Re: Responses to MDAQMD Requests for Additional Information for the Genesis Solar Energy Project

Dear Mr. Wales:

The following are our responses to your additional data requests dated 4-28-10 (attached at the end of this letter). The responses are presented in the same order as your requests.

1. The applicant has reviewed the proposed PDOC permit condition changes and we have the following comments:

a. We appreciate the removal of the non-applicable low load emissions limits on the HTF boilers, as well as the removal of the CEMs requirements.
b. The applicant is committed to purchasing engines for use on the emergency electrical generators and fire pump systems that meet all applicable Tier requirements for the size of engine, use category, and year of purchase.
c. We respectfully request that you re-review our comments and suggested changes to the permit conditions on the emergency electrical generators. The district's standard permit language, in some respects, has no bearing or connection to the actual use cycle of these engines at a solar facility. In addition, on the fire pump system, several of the conditions need to be removed as they simply do not apply to fire pump systems.

2. The carbon monoxide emissions value for the small boilers proposed for the HTF system in each power block have been revised to a value of 1.125 lbs/hr per boiler. This value is based on a CO emission rate of 50 ppm @ 3% O2, which is equivalent to 0.0375 lbs/mmbtu. The table which follows presents the revised CO emissions for these units.

Parameter	Single Unit	Two Units
mmbtu/hr	30.0	60.0
Hours/day	14	28
Hours/yr	1000	2000
CO lbs/hr	1.125	2.25
CO lbs/day	15.75	31.5
CO tons/yr	0.5625	1.125
50 ppm CO at 3% O2 = 0.0375 lbs/mmbtu, is scaled from a number of local air district rules which equate 400 ppm CO at 3% O2 as equivalent to 0.30 lbs/mmbtu. See South Coast AQMD Rules 1146, 1146.1.		

143 Union Boulevard, Suite 1010, Lakewood, CO 80228-1875
Tel 303.988.2202 Fax 303.980.3539
www.tteci.com

The revised CO emissions are well below the current MDAQMD threshold values for BACT (unit basis), as well as the offset thresholds. These values, as revised, would not be expected to have any discernable impacts on CO ambient air quality or the present attainment status of the project area for CO.

3. On those operational days which require boiler operation, the units are started and quickly brought up to operational load level. Water in the boilers is converted to low pressure steam which is used to provide seal steam for the steam turbine and in the non-contact heat transfer system to preheat the HTF to reduce system startup time. Low pressure steam from the boilers may also be used for initial preheating of steam system after prolonged periods of shutdown.

4. The applicant has already submitted permitting application forms for the HTF ullage and tank system. These systems, by design, incorporate the VOC controls as proposed. Notwithstanding the foregoing, permitting applications for the VOC control systems are enclosed as supplements to the existing HTF system applications. Attachment A to this response contains the available system design criteria for the HTF ullage and tank system as well as the VOC control system data. This data is preliminary and subject to change once the final HTF system design is completed. Attachment B contains the brief BACT analysis for the VOC control systems considered by the applicant.

5. The applicant would respectfully refer you to the language used by MDAQMD staff in the Mojave Solar One PDOC which addresses this issue. This proposed language is as follows:

   “The applicant shall install, operate, and maintain CARB approved Phase I and Phase II vapor recovery systems on the proposed facility gasoline tank and dispensing system. The Phase I and Phase II vapor recovery systems will meet all applicable CARB standards at the time of installation or the systems selected.”

   Reference: PDOC, Abengoa Mojave Solar Project, 2-26-10, Chris Anderson-MDAQMD Engineering staff.

6. The VOC emissions from the onsite HTF land treatment unit will be initially proposed at the following levels, based upon data derived from the Solar Millennium Ridgecrest Power Project, i.e., 0.169 lbs VOC/day, and 0.031 tons VOC/yr. Hazardous air pollutant emissions (speciated VOCs) of benzene and biphenyl will be based upon the following technical data:

   a. % wt of benzene and biphenyl will be the same values as assumed in the field component fugitive emissions calculations, i.e., 1% wt benzene, and 26.5% wt biphenyl.
   b. Benzene emissions from land treatment will be 0.00169 lbs/day, and 0.00031 tons/year. Hourly emissions will be equivalent to daily emissions divided by 8.8 hours per day, or 0.000192 lbs/hr.
   c. Biphenyl emissions from land treatment will be 0.0448 lbs/day, and 0.00822 tons/year. Hourly emissions will be equivalent to daily emissions divided by 8.8 hours per day, or 0.0051 lbs/hr.

Per comment #8 below, the land treatment unit emissions (area source) of HAPs were added to the HAPs emissions from the HTF field fugitive emissions (area source) for input into the HARP model. The land treatment unit HAPs emissions as noted above are essentially insignificant, and are not expected to impact the HRA results in any significant manner.

7. Cooling tower – The applicant does not believe that chloroform will be emitted from the cooling towers. The applicant provided a detailed set of calculations in Appendix K.1 of the AFC (see Table K.1-6) which delineated the anticipated HAPs to be emitted from the cooling towers, and the levels of each substance's emissions. The applicant is not proposing any changes to these values at this time. A copy of the cooling tower HAPs emissions calculations is presented in Attachment C.

   Boilers-The applicant supplied the AQMD (and CEC) with revised emissions calculations for the boilers in the initial data responses to the CEC and the AQMD. These revised calculations are presented in Attachment D.

8. The facility operations HRA has been revised to reflect the current emissions estimates for the processes involved in the HRA evaluation, including the HAPs generated from the land treatment process. The revised facility operations HRA shows the following risk related values:

   a. Maximum impacted receptor* (assumed MEIR) Cancer Risk = 3.27×10^{-6}
   b. Chronic HI = 0.00119
   c. Acute HI = 0.00668

   *Receptor #1, 686079mE, 3726978mN

   The revised HRA was run using the latest version of HARP and the latest version of HARP-On Ramp. The revised HRA values continue to indicate that the facility operational emissions will result in "insignificant" risks to exposed members of the surrounding population. All of the applicable input and output files are contained on the enclosed CD.

9. At the time of AFC preparation, the proposed federal one hour standard for NO2 had not been adopted. The newly adopted standard for NO2 of 0.100 ppm (188 ug/m^3) is attained based upon a 3-year average of the 98^{th} percentile of the daily maximum 1-hour averages (at each monitoring location). The applicant's original analysis used a 1-hour background value of 149 ug/m^3. The CEC re-analysis of NO2 background values resulted in a revised NO2 1-hour background level of 118.7 ug/m^3 (SA/EIS, Genesis Solar Energy Project, AFC 09-AFC-8, BLM/CEC, March 2010). The revised modeling will therefore use an NO2 1 hour background value of 118.7 ug/m^3. In addition, please note that the revised modeling for compliance with the new federal NO2 standard will only include those onsite stationary source emissions subject to the modeling requirements of the District's NSR rule, i.e., the small auxiliary boilers and the emergency generator and fire pump IC engines.

   Due to the complexity of the NO2 re-modeling analysis for the new federal 1 hour standard, the applicant is estimating that the results will not be available for at least 30 days from the date of this response, we are therefore asking for a 30 day extension from the District response date in order to provide adequate time to prepare the revised modeling analysis.

Please feel free to contact me at (530) 474-1893 if you have any questions concerning these responses, or our request for additional time to respond to AQMD Request #9.

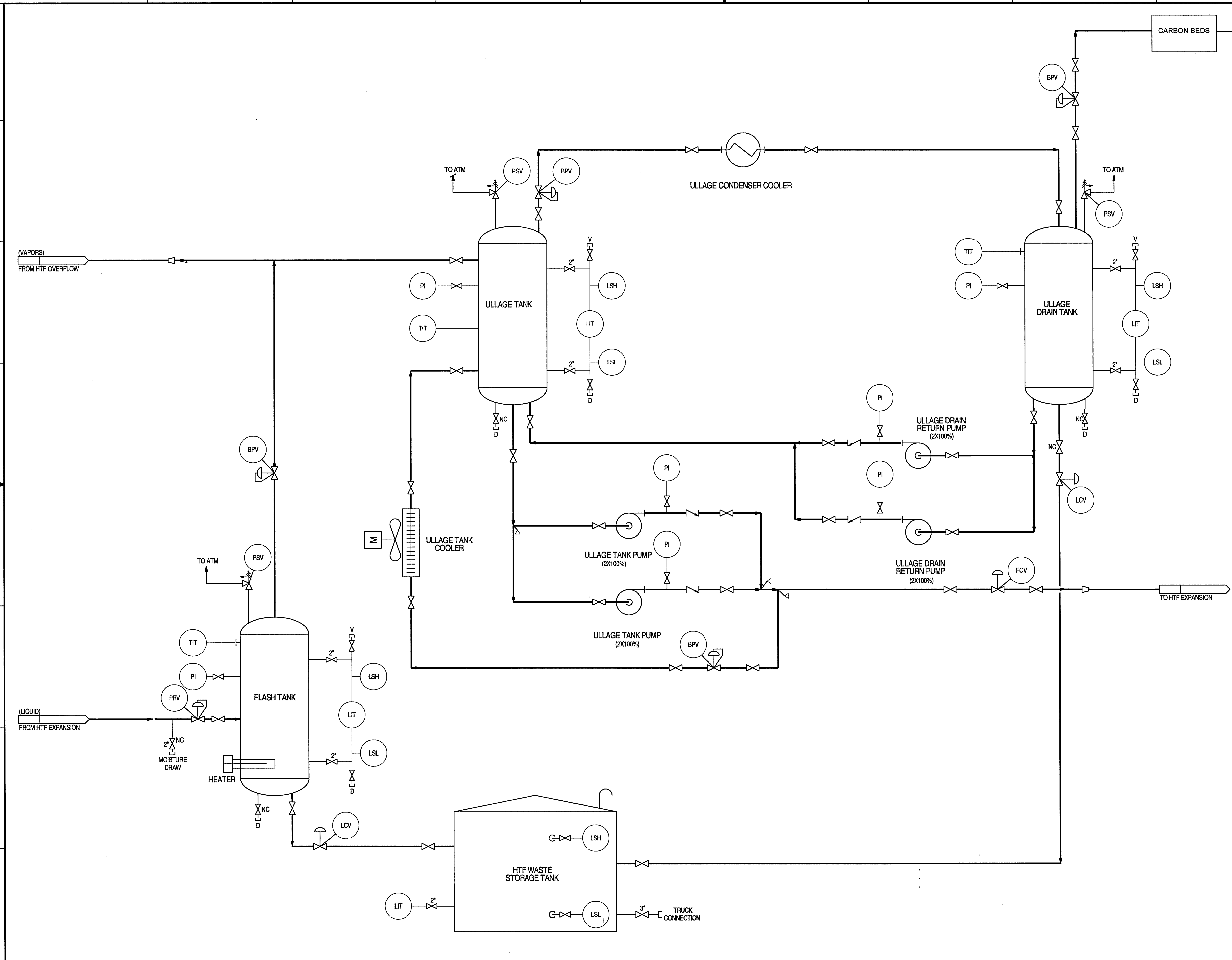
Respectfully Submitted,

Richard B. Booth

Richard B. Booth, Supv. Project Manager
Tetra Tech EC, Inc.

Cc: file

ATTACHMENT A



1. NOT FOR CONSTRUCTION

Zero Harm
Leadership
No Incidents
Safe Behavior

WorleyParsons
resources & energy

GENESIS SOLAR, LLC
GENESIS SSOLAR ENERGY PROJECT

ULLAGE SYSTEM
CONCEPTUAL SKETCH

SCALE	DRAWING SIZE
NONE	ARCH D (36" x 24")

WORLEYPARSONS DWG. NO.	REV
GENI-0-SK-022-305-001	A

9/10/2009 12:58:55 PM

Attachment A- Supplemental Text regarding PFD

A combination of nitrogen, HTF degradation gases and HTF vapors are gradually vented from the expansion vessel and passed to the Ullage system where the HTF vapors are condensed and collected for return to the expansion vessel. The Ullage system provides a means to separate low boilers from the HTF and collect them in order to control HTF purity. HTF vapor from the expansion tank is periodically vented to the ullage vessel where it is quenched at low pressure and temperature. The cool nitrogen and what remains of the HTF vapor and low boilers pass to the ullage drain tank through a cooler and are quenched and cooled again in ullage drain tank. The HTF and low boilers that condense in the ullage tank are pumped back into the expansion tank. The pump is activated by a high level switch. The HTF is circulated through a cooler and back to the ullage tank to maintain vessel temperature. The pump and cooler fan start and stop according to a vessel temperature switch. Condensed HTF and low boilers from the ullage drain tank continue to the waste vessel based on a level switch that opens the drain valve when the liquid volume exceeds limits. Cooling water is used to cool the HTF entering the ullage drain tank. Remaining vapor is vented to activated carbon beds with a control efficiency of approximately 98% for removal of VOC. The carbon beds are then vented to atmosphere.

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 AUTHORITY TO CONSTRUCT AND PERMIT TO OPERATE

Page 1 of 2: please type or print REMIT $226.00 WITH THIS DOCUMENT ($129.00 FOR CHANGE OF OWNER)

1. Permit To Be Issued To (company name to receive permit): Genesis Solar, LLC	1a. Federal Tax ID No.: 35-2303285
2. Mailing/Billing Address (for above company name): 700 Universe Blvd., Juno Beach, FL. 33408	
3. Facility or Business License Name (for equipment location): Genesis Solar Energy Project	
4. Facility Address - Location of Equipment (if same as for company, enter "Same"): Riverside County, Blythe, CA	Location UTM or Lat/Long: 33°38'5.39" N, 114°57'20.58"W

5. Contact Name/Title: Duane McCloud	Email Address: duane.mccloud@nexteraenergy.com	Phone/Fax Nos.: (561) 694-3577

6. Application is hereby made for Authority To Construct (ATC) and Permit To Operate (PTO) the following equipment:
Genesis Solar Energy Project (See AFC Air Quality section and appendices for equipment details)

Air Pollution Control Equipment, if any (note that most APCE require a separate application):
VOC Control system for HTF Tankage and Distribution System for the Unit-1 Solar Field and Power Block

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

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):
Solar Electric Power Generation	Electricity	

10. Distances (feet and direction to closest): **See AFC for this data.**

________ Fenceline ________ Residence ________ Business ________ School

11. Facility Annual Throughput by Quarters (percent):				12. Expected Facility Operating Hours:			
25 %	25 %	25 %	25 %	16	7	52	5840
Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Hrs/Day	Days/Wk	Wks/Yr	Total Hrs/Yr

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

14. Signature of Responsible Official: Scott C. Busa	Official Title: Director	
Typed or Printed Name of Responsible Official: Scott A. Busa	Phone Number: (561) 691- 2889	Date Signed: 5-14-10

- 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.	FT. agl Stack Height	FT. Stack Diameter	F deg Exhaust Temp	ACFM Exhaust Flow Rate	FT/SEC Exhaust Velocity
1					
2					
3					
4					

additional stacks

5	
6	
7	
8	**See response support data for this information.**
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	

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.):

None, See AFC Sections on Air Quality and Public Health, and Appendices.

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

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 $226.00 WITH THIS DOCUMENT ($129.00 FOR CHANGE OF OWNER)

1. Permit To Be Issued To (company name to receive permit): Genesis Solar, LLC	1a. Federal Tax ID No.: 35-2303285
2. Mailing/Billing Address (for above company name): 700 Universe Blvd., Juno Beach, FL. 33408	
3. Facility or Business License Name (for equipment location): Genesis Solar Energy Project	
4. Facility Address - Location of Equipment (if same as for company, enter "Same"): Riverside County, Blythe, CA	Location UTM or Lat/Long: 33°38'5.39" N, 114°57'20.58"W

5. Contact Name/Title: Duane McCloud	Email Address: duane.mccloud@nexteraenergy.com	Phone/Fax Nos.: (561) 694-3577

6. Application is hereby made for Authority To Construct (ATC) and Permit To Operate (PTO) the following equipment:
Genesis Solar Energy Project (See AFC Air Quality section and appendices for equipment details)

Air Pollution Control Equipment, if any (note that most APCE require a separate application):
VOC Control system for HTF Tankage and Distribution System for the Unit-2 Solar Field and Power Block

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

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

9. General Nature of Business: Solar Electric Power Generation	Principal Product: Electricity	SIC Code (if known):

10. Distances (feet and direction to closest): **See AFC for this data.**

________ 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
16	7	52	5840

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

14. Signature of Responsible Official: Scott C. Busa	Official Title: Director	
Typed or Printed Name of Responsible Official: Scott A. Busa	Phone Number: (561) 691- 2889	Date Signed: 5-14-10

- 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.	FT. agl Stack Height	FT. Stack Diameter	F deg Exhaust Temp	ACFM Exhaust Flow Rate	FT/SEC Exhaust Velocity
1					
2					
3					
4					

additional stacks

5	
6	
7	
8	**See response data for this information.**
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	

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.):

None, See AFC Sections on Air Quality and Public Health, and Appendices.

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.

ATTACHMENT B

Attachment B

BACT Determination for GSEP HTF Expansion Tank/ Ullage System Emissions

The Genesis Solar Energy Project (GSEP) HTF expansion tanks will be blanketed with nitrogen gas to keep the headspace in the expansion tanks non-explosive. The nitrogen may become saturated with VOC as it is in contact with the HTF and any volatile HTF breakdown products. When the HTF heats and expands, the nitrogen gas which is potentially saturated with VOC is vented. VOCs can generally be further controlled, depending on a number of factors, including flow rate, VOC concentration, moisture content, and the specific properties of the VOC involved. The mixture of gases containing VOCs from the expansion vessel(s) enters the ullage system, which contains a certain level of HTF at any time. The HTF vapor within the gas mixture condenses and is recirculated to the HTF cycle. If necessary, the HTF content of the first ullage vessel is cooled by recirculation via an air cooler. Leaving the first ullage vessel, residual mixture of gas enters the second ullage vessel, where it will be further condensed. The content of the second ullage vessel is cooled by recirculation via a second air cooler. By cooling, the hydrocarbons within the gaseous mixture condense to a large extent and are collected in the ullage drain vessel. Residual gaseous components are vented to a series of activated carbon beds, which are expected to reduce VOC emissions by 98-99 percent. The volume of collected liquid residuals and vented gas will depend upon the final operating temperature during the previous day of operation and the temperature of the system overnight.

<u>BACT Background</u>

In general, California New Source Review Regulations require a control technology that has been achieved in practice for a class or category of source be required as BACT for sources in that class or category without considering case-by-case economic impact. (Note: In some cases, economic considerations may be taken into account in establishing a class or category of source.) Additionally, many air districts require other more effective technologies that have not been achieved in practice for a class or category of source if the control is shown to be technologically and economically feasible.

Unlike federal BACT that only apply to major sources, California requirements apply to a great variety of small and large sources. Therefore, clear identification of the sources that are included in a given class or category for which a BACT determination is being or has been made is critical to reasonable implementation of BACT requirements in California. Additionally, it is vitally important to ascertain the availability, reliability, and effectiveness of a control technology before deeming it as having been achieved in practice for a class or category of sources.

Based on CARB guidance, the following criteria should be used in determining whether an emissions unit belongs to a class or category of source for which a control technology has been achieved in practice:

A. Source Size (e.g., rating or capacity): The degree of needed similarity may vary based on the equipment type and size. In general, size thresholds that signify a change in emission producing characteristics of the equipment provide for a reasonable delineation based on size. Generally accepted size designations (e.g., small, medium, and large) for a piece of equipment may also be used in defining a class or category of source. It should be noted that EPA does not consider size in defining a class or category of source.

B. Capacity Factor: Limited use, standby, or seasonal equipment are not usually lumped together with full time equipment in a single class or category.

C. Unique Operational/Technological Issues: Certain operational needs and characteristics can impact the effectiveness of a control technology or process. Operational or technological needs with demonstrable impact on effectiveness or reliability of basic equipment, operation, process, or control technology that are essential to successful operation of an emission unit and cannot be overcome by other reasonable measures can be used in defining a class or category of source. Also, in certain situations, available pre-existing resources at a facility play a key role in rendering certain control technologies feasible. Requiring similar controls at facilities that do not have the same existing resources may not be advisable.

It should be noted that different BACT control levels may be established within the same class and category of source for varying operational modes.

<u>Achieved in Practice Determinations</u>

For an emission or performance level to be achieved in practice for a class or category of source, it should be commercially available, have demonstrated reliability of operation, and have a documented effectiveness verified by acceptable forms of emission or performance measurement.

A. Commercial Availability: At least one vendor should offer the control technology or equipment able to reach an achieved-in-practice emission limit or performance requirement for regular or full-scale operation within the United States. (On the federal level, determinations made outside of the US should also be considered. These considerations, in some instances, can be very difficult to include due to the lack of an organized clearinghouse for compilation of data.)

B. Reliability in Operation: The control technology or equipment should have operated for a reasonable time period in a manner that would provide an expectation of continued reliability. It is not necessary that the equipment operation be continuous, but that the equipment operate reliably in a manner typical of the class or category of source.

C. Effectiveness: The control technology or equipment should be verified to perform effectively over the range of operation expected for the class or category of source. If the control technology or equipment will be allowed to operate at lesser effectiveness during certain modes of operation, then those modes of operation must be identified. The verification should be based on a performance test or tests, when possible, or other performance data.

Any control technology listed in a permitting agency's BACT Clearinghouse must be considered in establishing BACT requirements for that class or category of source. However, prior to accepting another agency's BACT determination as having been achieved in practice for a class and category, the permitting agency should verify that the technology has been achieved in practice in accordance with the above guidelines. Existing information should be used to the extent needed to prove that the technology has been achieved in practice.

<u>Technology Transfer</u>

Control technologies previously achieved in practice for a class and category of sources and/or other technologically feasible controls should be considered for transfer to other class or category of sources. Potentially transferable control technologies may be either add-on exhaust stream controls, or process controls and modifications. For the first type, technology transfer should be considered between sources that produce similar exhaust streams. For the second type, technology transfer should be considered between sources with similar processes.

<u>BACT Analysis Approach</u>

EPA recommends using a “top-down” approach for determining BACT. This approach essentially ranks potential control technologies in order of effectiveness and ensures that the best technically and economically feasible option is chosen. As described in EPA’s *New Source Review Workshop Manual*, draft, October 1990, the general methodology of this approach is as follows:

1. Identify potential control technologies, including combinations of control technologies, for each pollutant subject to NSR-PSD review.
2. Evaluate each control technology for technical feasibility; eliminate those determined to be technically infeasible.
3. Rank the remaining technically feasible control technologies in order of control effectiveness.
4. Assume the highest-ranking technically feasible control represents BACT, unless it can be shown to result in adverse environmental, energy, or economic impacts.
5. Select BACT.

EPA and State maintained RACT/BACT/LAER Clearinghouses (RBLCs) are considered as principal references for identifying potential control technologies and emission rates used in past permitting of similar sources. These databases were queried for entries since January 2000 involving VOC controls on VOC emitting processes from sources such as storage tanks, process tanks, and ullage systems. Virtually no data was found that was directly applicable or comparable to an HTF ullage system. As such, data delineated in previously submitted solar energy projects became the basis for the BACT analysis.

The “top-down” procedure is followed for the BACT analyses for the pollutants evaluated in this analysis, with a focus on identifying emission limitations or control technologies that are achieved in practice and technically feasible. The sections following present the BACT analyses and proposed VOC limits and controls.

GSEP BACT Analysis

The BACT process, in practice, considers the following:

1. Inherently lower-emitting processes or practices, including the use of materials and production processes that prevent or lower emissions, or,
2. Add-on controls that control or reduce emissions after they are produced, or,
3. A combination of inherently lower emitting processes and add-on controls.

Inherently Lower Emitting Process/Practices

In the case of a solar energy plant, which utilizes a heat transfer fluid (HTF), the process control option (inherently lower emitting processes, etc) is not an option. HTF fluids used in the solar power process (Dowtherm A, Therminol VP-1, etc.) are the most economical and viable materials to accomplish the required heat transfer efficiencies and maintain the economic viability of the plant. GSEP will continue to investigate the availability of other such fluids and consider their use if technically feasible in the system as designed and built.

Add-On Control Technologies

Add-on control technologies are presented below (not in order of control efficiency):

1. Closed Vapor System
2. Thermal oxidation
3. Regenerative thermal oxidation (RTO)
4. Carbon adsorption
5. Catalytic oxidation
6. A combination of technologies, such as a carbon adsorber concentrator followed by an oxidation technology
7. Refrigerated condenser

In a Closed Vapor System, when the HTF heats and expands, the VOC saturated nitrogen will be captured, compressed, and stored in a small pressurized tank. When the HTF cools and contracts, the nitrogen is replaced from the pressurized tank. Ideally, this design serves to conserve nitrogen and completely eliminates VOC emissions from the expansion tanks. There have been some concerns raised by some engineering contractors regarding the safety of a closed vapor system such as this. While this approach almost completely eliminates VOC emissions and has been proposed at other solar thermal facilities, this has not been applied to full scale facility, and hence, not achieved in practice. Therefore a closed vapor system cannot be considered BACT.

Thermal oxidation uses high temperature combustion (1,200 °F - 2,400 °F) to control air pollutants in vapor streams. Capital equipment costs vary according to system size. Fuel requirements (costs) are generally higher than other oxidation technologies. Thermal oxidation usually works best when operated continuously; intermittent operation is impractical due to long heat up times for the combustion chamber, and frequent thermal cycling stresses the refractory and shortens equipment life. Thermal oxidation is assumed to have a control efficiency of 95 or greater, but requires the combustion of fuel and thus would be a source of secondary (combustion) pollutants. Because the HTF venting is not a continuous process, the thermal oxidation is not well suited to the application and has been eliminated from further consideration as BACT. Furthermore, as a result of the new federal NO2 one hour standard, coupled with background data for the proposed site, the choice of any additional combustion devices that would increase NOx emissions is not an option for the HTF VOC control system, and as such thermal oxidation is removed from further consideration.

RTO uses two or more heat exchangers to carry out oxidation and heat recovery. RTOs typically consume less energy than other oxidation processes and can recover 90 to 95 percent of the heat generated by oxidation. RTO control efficiencies are typically greater than 95 percent and can exceed 99 percent in some installations. RTOs are ideal for low- to moderate-VOC concentrations, high gas volume, and continuous operations. Because the HTF venting is not a continuous process, the RTO is not well suited to the application and has been eliminated from further consideration as BACT. Furthermore, as a result of the new federal NO2 one hour standard, coupled with background data for the proposed site, the choice of any additional combustion devices that would increase NOx emissions is not an option for the HTF VOC control system, and as such RTO technology is removed from further consideration.

Carbon adsorption is a process where an activated carbon with high surface area is used to capture air pollutants. Single carbon beds typically are designed for 95 percent control, and multiple beds in series can achieve control efficiencies of 98+ percent or more. Adsorption of the hydrocarbons proceeds until the carbon is saturated or spent. Then the carbon must either be regenerated or replaced. Carbon adsorption is considered as an “achieved in practice” technology, but can be an expensive control technology for high concentration and/or high volume vapor streams. Carbon adsorption systems of various designs and configurations seem to be control system of choice for a majority of the proposed solar facilities utilizing HTF based systems.

Catalytic oxidation uses a metal catalyst to lower the temperature range for oxidation of VOC to 550°F - 650°F. Therefore, catalytic oxidation can be more cost-effective than direct thermal oxidation for vapor streams with low heat content. Control efficiencies are comparable to thermal oxidation. Similar to thermal oxidation, catalytic oxidation requires the combustion of fuel and thus would be a source of secondary (combustion) pollutants. The catalyst bed is prone to poisoning under certain circumstances. Furthermore, as a result of the new federal NO2 one hour standard, coupled with background data for the proposed site, the choice of any additional combustion devices that would increase NOx emissions is not an option for the HTF VOC control system, and as such catalytic oxidation is removed from further consideration.

The combination of carbon adsorption followed by an oxidation technology is ideally suited to a vent stream with high gas volumes and low VOC concentrations, which matches the source parameters of the typical HTF ullage system. Because the principle mechanism for emissions control is carbon adsorption, the control efficiency is expected to be the same as carbon adsorption alone. The difference between this alternative and carbon alone is the manner in which the carbon is regenerated. With the combination technology, the carbon is regenerated onsite with hot air and the resulting air/vapor stream processed in a thermal oxidizer to destroy VOC. Like all other thermal oxidizers, this technology causes emissions of secondary pollutants from the combustion of fuel and VOC. Typically, the selection of this technology over carbon alone is due to an economic advantage of onsite regeneration (as opposed to offsite regeneration for a fee that is typical of carbon alone). Furthermore, as a result of the new federal NO2 one hour standard, coupled with background data for the proposed site, the choice of any additional combustion devices that would increase NOx emissions is not an option for the HTF VOC control system, and as such a combination of technologies that includes a combustion component thermal is removed from further consideration.

A Refrigerated or Water-cooled Condenser is a control option that can be used to condense the VOC vapors leaving the HTF expansion tanks. The control efficiency of a refrigerated or water-cooled condenser depends on the vapor pressure of the VOC and the temperature of the coolant. Control efficiencies are typically lower than other VOC control technologies. Due to the very low vapor pressure of HTF at ambient temperature, the control efficiency of a water-cooled condenser is expected to exceed 99 percent for HTF; however, byproducts of thermal degradation of the HTF may include benzene and other light hydrocarbons. The control efficiency of a watercooled condenser for benzene would be substantially lower. Because the control efficiency of the water-cooled condenser for benzene is substantially lower than either the carbon adsorption or the oxidation technologies, the water-cooled condenser doesn't satisfy BACT and is rejected for this application.

Based on the above analysis, carbon adsorption technology is the only feasible control option for the HTF system at present for the GSEP HTF tanks and ullage system.

Cost Effectiveness Data

A detailed cost analysis of three (3) control technologies was presented in the BACT analysis for the Nevada Solar One Project (NSOP). The NSOP is a concentrated solar trough project similar to the GSEP. The NSOP is rated at 64 MW (nominal) and 75 MW (maximum) output, so it smaller than the proposed GSEP (at 250 MWs). Although smaller than GSEP, the cost data for NSOP is considered to be valid based upon a linear scale-up of plant size and resultant VOC emissions. The final average control costs for NSOP for the following VOC control technologies are as follows:

- RTO - $6800/ton VOC removed.
- Catalytic Oxidation - $6300/ton VOC removed.
- Carbon Adsorption - $10,500/ton VOC removed

The applicant believes these costs would basically be valid for the GSEP. Currently EPA, and most state and local air agencies use a cost effectiveness threshold for VOC controls at $5000/ton VOC removed. The data above for NSOP, as applied to GSEP also shows that the control technology costs are well above this threshold, and for purposes of BACT would not be considered cost effective.

BACT Selection

Notwithstanding the cost data above which clearly exceeds current EPA and air district cost thresholds for VOC controls, GSEP is presently proposing to use a nitrogen blanketing system with carbon absorption to reclaim usable HTF liquids and control VOC emissions to an estimated total from both HTF systems of 2.95 lb/day (0.54 tons VOC/yr).

Although carbon adsorption is being selected as BACT by the applicant, the applicant is reviewing other control systems and HTF system designs to ascertain if such systems or designs will result in lower system VOC emissions. The applicant retains the right to propose, permit, and seek approval of these systems for the GSEP project if they result in improvements in the basic system design, add-on controls, and lower VOC emissions.

ATTACHMENT C

Attachment C **(Table K.1-6)**

Calculation of Hazardous and Toxic Pollutant Emissions from Cooling Towers

			Op Hrs/Day:	15
Cells per Tower:	7	Max Tower Drift Rate:	236.5 lbs/hr	Op Hrs/Yr: 3200
# of Identical Towers:	2		Tower C of C:	3.00

Constituent	Concentration in Cooling Tower Water		Total Single Tower Emissions, lb/hr	Total Single Tower Emissions, lb/day	Total Single Tower Emissions, ton/yr	Single Cell Emissions, lb/hr	Single Cell Emissions, lb/day	Single Cell Emissions, ton/yr	Total All Towers Emissions, lb/hr	Total All Towers Emissions, lb/day	Total All Towers Emissions, ton/yr
Manganese	0.029	ppm	2.06E-05	3.09E-04	3.29E-05	2.94E-06	4.41E-05	4.70E-06	4.12E-05	6.17E-04	6.58E-05
Magnesium	14	ppm	9.93E-03	1.49E-01	1.59E-02	1.42E-03	2.13E-02	2.27E-03	1.99E-02	2.98E-01	3.18E-02
Lead	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Arsenic	0.0092	ppm	6.53E-06	9.79E-05	1.04E-05	9.32E-07	1.40E-05	1.49E-06	1.31E-05	1.96E-04	2.09E-05
Aluminum	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chromium	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cadmium	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Copper	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nickel	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beryllium	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vanadium	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Barium	0.033	ppm	2.34E-05	3.51E-04	3.75E-05	3.34E-06	5.02E-05	5.35E-06	4.68E-05	7.02E-04	7.49E-05
Cobalt	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Antimony	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thallium	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Molybdenum	0.24	ppm	1.70E-04	2.55E-03	2.72E-04	2.43E-05	3.65E-04	3.89E-05	3.41E-04	5.11E-03	5.45E-04

Notes:
(1) Water analysis data supplied by project applicant. See support data on next page.
(2) analysis values for 800 bgs well
(3) mg/l = ppmw

ATTACHMENT D

Attachment D (Table K.1-2 Boiler #1 and #2)

Calculation of Noncriteria Pollutant Emissions for Boilers Firing Gaseous Fuels

Boiler Operation Mode:	Normal firing mode		# of Units:	2
Ops Hr/Day:	14	Worst Case	Fuel Type:	Nat Gas
Ops Hr/Yr:	1000			

Calculation of Noncriteria Pollutant Emissions from Each Identical Unit

Compound	Emission Factor, lb/MMscf (1)	Maximum Hourly Emissions, lb/hr (2)	Maximum Daily Emissions, lb/day	Maximum Annual Emissions, lbs/yr	Annual Emissions, ton/yr (3)	All Units: Maximum Hourly Emissions, lb/hr	All Units: Maximum Daily Emissions, lb/day	All Units: Maximum Annual Emissions, lbs/yr	All Units: Annual Emissions, ton/yr
Acetaldehyde	4.61E-03	1.36E-04	1.90E-03	1.36E-01	6.78E-05	2.71E-04	3.80E-03	2.71E-01	1.36E-04
Acrolein	4.51E-03	1.33E-04	1.86E-03	1.33E-01	6.63E-05	2.65E-04	3.71E-03	2.65E-01	1.33E-04
Ammonia	(5)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	2.43E-03	7.15E-05	1.00E-03	7.15E-02	3.57E-05	1.43E-04	2.00E-03	1.43E-01	7.15E-05
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ethylbenzene	2.25E-03	6.62E-05	9.26E-04	6.62E-02	3.31E-05	1.32E-04	1.85E-03	1.32E-01	6.62E-05
Formaldehyde	4.75E-03	1.40E-04	1.96E-03	1.40E-01	6.99E-05	2.79E-04	3.91E-03	2.79E-01	1.40E-04
Hexane	6.30E-03	1.85E-04	2.59E-03	1.85E-01	9.26E-05	3.71E-04	5.19E-03	3.71E-01	1.85E-04
Naphthalene	2.37E-04	6.97E-06	9.76E-05	6.97E-03	3.49E-06	1.39E-05	1.95E-04	1.39E-02	6.97E-06
PAHs (4)	8.10E-05	2.38E-06	3.34E-05	2.38E-03	1.19E-06	4.76E-06	6.67E-05	4.76E-03	2.38E-06
Propylene	4.63E-01	1.36E-02	1.91E-01	1.36E+01	6.81E-03	2.72E-02	3.81E-01	2.72E+01	1.36E-02
Propylene oxide	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	3.23E-02	9.50E-04	1.33E-02	9.50E-01	4.75E-04	1.90E-03	2.66E-02	1.90E+00	9.50E-04
Xylene	1.87E-02	5.50E-04	7.70E-03	5.50E-01	2.75E-04	1.10E-03	1.54E-02	1.10E+00	5.50E-04
		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Notes:

(1) natural gas HAPs emission factors

(2) Based on maximum hourly boiler fuel use of 30 MMBtu/hr/boiler
and fuel HHV of 1020 Btu/scf gives 0.0294 MMscf/hr/boiler.

(3) Based on maximum annual boiler fuel use of 30,000 MMBtu/yr/boiler
and fuel HHV of 1020 Btu/scf gives 29.4118 MMscf/yr/boiler.

(4) Polycyclic aromatic hydrocarbons, excluding naphthalene (treated separately).

(5) LNB only with GCPs

Refs:

CARB Catef Database, Heater, NG, SCC 31000404

SDAPCD, B17, Toxics EFs Database

April 28th Data Request
from the Mojave Desert
Air Quality Management District

MOJAVE
air quality management district
DESERT

Mojave Desert Air Quality Management District
14306 Park Avenue, Victorville, CA 92392-2310
760.245.1661 • fax 760.245.2699
Visit our web site: http://www.mdaqmd.ca.gov
Eldon Heaston, Executive Director

April 28, 2010

Ryan O'Keefe, Vice President
Genesis Solar LLC
700 Universe Boulevard
Juno Beach, Florida 33408

Request for Additional Information from the Genesis Solar Energy Project

Dear O'Keefe:

On February 18, 2010 the Mojave Desert Air Quality Management District (MDAQMD) issued the 'Preliminary Determination of Compliance' (PDOC) for the Genesis Solar Power Project to be located approximately 25 miles west of Blythe, CA. The following are the MDAQMD recommended changes and list of MDAQMD and items that the applicant will need to address prior to issuance of 'Final Determination of Compliance' FDOC:

1. Review and comment on all the MDAQMD proposed changes.
2. Verify and submit the CO calculations converting 50 ppm of CO to 0.563 pounds of CO per hours. Per the California Energy Commission (CEC) 39 PPM of CO converts to 1.14 pounds of CO per hour.
3. How are the low pressure boilers used to generate steam for start-up.
4. The applicant still needs to submit a applications for the carbon adsorption systems to include details of the system and the control efficiency. These applications need to contain a Top-Down BACT analysis. As an example the MDAQMD has enclosed a BACT analysis from another solar power project.
5. Submit details on the model or type of tank and vapor control equipment that it will meet California Air Resources Board's (CARB) requirements for gasoline storage and handling.
6. Revise the emission calculations and Health Risk Assessment (HRA) to include the criteria and toxic emissions from the Land Treatment Unit
7. Review each of the following emission sources and the list toxic substances and qualify the emissions (Note the application listed PAH as a substance emitted and may have included the individual PAHs.):

Emission Source	Substance	
	CAS	Name
Cooling Tower	67663	Chloroform
Boilers ICE	83329	Acenaphthene [PAH, POM]
	208968	Acenaphthylene [PAH, POM]
	120127	Anthracene [PAH, POM]
	56553	Benz[a]anthracene [PAH, POM]
	50328	Benzo[a]pyrene [PAH, POM]
	205992	Benzo[b]fluoranthene
	191242	Benzo[g,h,i]perylene [PAH, POM]
	207089	Benzo[k]fluoranthene [PAH, POM]
	53703	Dibenz[a,h]anthracene [PAH, POM]
	206440	Fluoranthene [PAH, POM]
	193395	Indeno[1,2,3-cd]pyrene [PAH, POM]
	85018	Phenanthrene [PAH, POM]
	129000	Pyrene [PAH, POM]
	25321226	Dichlorobenzenes (mixed isomers)
	7440508	Copper
	7440622	Vanadium (fume or dust)
	7440666	Zinc

8. Revise the HRA using the revised toxic emission plus the emissions from the Land Treatment Unit.
9. Per Table 5.2-17 the maximum 1-hour NO_2 ambient air concentration from this project is 189.7 $\mu g/m^3$ and the proposed Federal NAAQS 1-hour NO_2 is 100 ppb or 189 $\mu g/m^3$. Therefore the applicant may need to review this one hour ambient air concentration valve.

The MDAQMD can't issue a Final Determination of Compliance until the applicant response to the above comments and requests for additional information.

If you have any questions regarding this action or the enclosure, please contact Mr. Richard T. Wales at (760) 245-1661, x 1803.

Sincerely,

Alan J. De Salvio
Supervising Air Quality Engineer

Enclosures: MDAQMD Proposed Changes and Request for more Information for FDOC
BACT Determination for HTF Expansion Tank/Ullage System Emissions

cc: Will Walters, Aspen Environmental Group

Email Meg Russell – NextEra Energy
Tricia Bernhardt – Tetra Tech, EC Project Manager

AJD/rtw GSEP_PDOC_Data_Request_letter.doc

Genesis Solar Power Project
MDAQMD Proposed Changes and Request for more Information for FDOC
April 27, 2010

On February 18, 2010 the Mojave Desert Air Quality Management District (MDAQMD) issued the 'Preliminary Determination of Compliance' (PDOC) for the Genesis Solar Power Project to be located approximately 25 miles west of Blythe, CA. The following are the MDAQMD recommended changes and list of MDAQMD and items that the applicant will need to address prior to issuance of 'Final Determination of Compliance' FDOC:

1. Auxiliary Boilers
   a. These boilers are low pressure steam boilers are for HTF freeze protection and plant start-up. These boilers are not used to produce steam for electrical generation for sale.
   b. Because the emissions don't have a linear relationship with load the requirements in Condition #3 will be set to the limit at 100% load. This condition will now read as follows:
      3. Emissions from this equipment shall not exceed the following hourly emission limits at any firing rate, verified by fuel use and annual compliance tests:
         a. NO_x as NO_2: 0.330 lb/hr operating at 100% load (based on 9.0 ppmvd corrected to 3% O_2 and averaged over one hour)
         b. CO: 0.563 lb/hr operating at 100% load (based on 50 ppmvd corrected to 3% O_2 and averaged over one hour)
         c. VOC as CH_4: 0.088 lb/hr operating at 100% load
         d. SO_x as SO_2: 0.008 lb/hr operating at 100% load
         e. PM_{10}: 0.150 lb/hr operating at 100% load
   c. Condition #4 that requires a CEMS will be dropped since Condition #7 requires a source test at startup. Condition #7 will be modified to require the initial source test within 90 days of reaching full load or 180 days of initial start-up which every occurs first. Also, Condition #8 will be modified to require annual source testing for NOx, VOC, and CO
   d. The applicant needs to verify and submit the CO calculations converting 50 ppm of CO to 0.563 pounds of CO per hours. Per the CEC 39 PPM of CO converts to 1.14 pounds of CO per hour.

2. Emergency Generators and Fire Pumps
   a. The diesel engines used to power these units will have to be the last Tier of engine as required by the California ARB ATCM at the time the permits are issued. The current require is a Tier 2 engine for greater than 750 bhp and Tier 3 for less than 750 bhp.. If the engines are not purchased within 2 years of when the ATC is issued then the engines must meet the Tier for an emergency engine of the time of purchase. The USEPA does not require Tier 4 for emergency engines.
   b. The permit condition can be rewritten limiting the facility to testing only one engine in any day (midnight to midnight).

c. The applicant asked for several changes to the standard permit conditions for emergency engines. The MDAQMD is not currently included to modifying standard permit language.

d. Per the CEC the VOC emission in the PDOC need to be modify (increase) to match the applications for the emergency generators. A review shows the PDOC and revised application information dated Feb 12, 2010, see below matches.

EFs (g/bhp-hr)		**Single Engine**				***All Engines***			
		Lb/Hr	**Lb/Day**	**Lbs/Yr**	**Tons/Yr**	***Lb/Hr***	***Lb/Day***	***Lbs/Yr***	***Tons/Yr***
NOx	4.93	14.56	14.56	728.10	0.364	*29.12*	*29.12*	*1456.20*	*0.73*
CO	0.13	0.38	0.38	19.20	0.010	*0.77*	*0.77*	*38.40*	*0.02*
VOC	0.01	0.03	0.03	1.48	0.001	*0.06*	*0.06*	*2.95*	*0.001*
PM10	0.018	0.05	0.05	2.66	0.001	*0.11*	*0.11*	*5.32*	*0.003*
SOx	NA	0.01	0.01	0.74	0.0004	*0.03*	*0.03*	*1.48*	*0.001*
	lbs/gal								
CO2	22.38	1611	1611	80568	40	*3223*	*3223*	*161136*	*81*
Methane	0.0003	0.02	0.02	1.08	0.001	*0.04*	*0.04*	*2.16*	*0.001*
N2O	0.0001	0.01	0.01	0.36	0.0002	*0.01*	*0.01*	*0.72*	*0.0004*
CO2e					40.4				*80.7*

e. The 'routine and predictable' emissions from the engines based upon a maximum1 hour of operations per day and 50 hours per year are less than 25 pounds per day and therefore, not subject to BACT.

Emergency Generator - 1341 bhp					
EFs (g/bhp-hr)		Single Engine			
		Lb/Hr	Lb/Day	Lbs/Yr	Tons/Yr
NOx	4.93	14.56	14.56	728.1	0.36
Fire Pump - 315 bhp					
EFs (g/bhp-hr)		Single Engine			
		Lb/Hr	Lb/Day	Lbs/Yr	Tons/Yr
NOx	2.69	1.87	1.87	93.32	0.05

f. On April 22, 2010 a review of the was made of the BACT Guidelines for Bay Area AQMD dated April 13, 2009, San Joaquin Valley UAPCD dated July 10, 2009 and the South Coast AQMD dated October 3, 2008 for emergency generators and all 3 agencies considers the latest Tier engine as BACT.

3. Since this facility does not have a stationary gas turbine district Rule 1134 does not apply the following will be add: "Since the GSEP does not have a stationary gas turbine, this rule does not apply."

2. All Rule references to Rules are to MDAQMD Rules.

5. The first three paragraphs of Section 3 can be rewritten as follows:

The proposed facility will consist of two 125 MW (gross) solar thermal units. The Project uses parabolic trough solar thermal technology to generate electricity. In each power generating unit or power block, the proposed technology uses a steam turbine generator (STG) fed from a solar steam generator (SSG). SSGs receive heat transfer fluid (HTF) from solar thermal equipment comprised of arrays of parabolic mirrors that collect energy from the sun.

Each of the two ~~power blocks~~ facilities will consist of a solar array field, auxiliary low pressure steam boiler for the HTF freeze protection system and plant start-up steam, steam turbine, emergency generator set, emergency fire pump system, an HTF ullage/expansion system with a nitrogen blanket[1], wet cooling tower, electrical interconnections, control room, water treatment, maintenance/warehouse facility, a parking lot, and several small adjacent buildings for support services. The two power blocks share a main office building, storage facilities, a central switchyard, access roads and a land treatment unit to treat HTF contaminated soil.

GSEP is proposing to install:

- two (2) auxiliary natural gas fired low pressure steam boilers for maintaining the HTF temperature and provide start-up steam each rated at - 30 MMBtu/hr
- two (2) HTF ullage/expansion tanks with nitrogen blanked
- two (2) cooling towers with a water circulation rate of 94,623 gpm and each with drift eliminator
- two (2) latest Tier diesel fueled emergency fire pump engines rated at 315 hp
- two (2) latest Tier diesel fueled emergency generator set rated at 1341 hp

6. (Ullage Vent System) Authority to Construct Conditions

The applicant still needs to submit an applications for the carbon adsorption systems to include details of the system and the control efficiency. These applications need to contain a Top-Down BACT analysis.

Rewrite the equipment description to read as follows: "Two – HTF ullage expansion tanks, Application Number: 00010842 and 00010843

Rewrite Condition #4 as follows: "The ullage vent system shall be vented to control system with at ~~leat~~ least ~~99%~~ 98% control efficiency for VO~~X~~C and toxic substances."

[1] The applicant is considering a VOC control system. It may either be a chiller/condenser, carbon absorption or a combination of such technologies. See the letter from Tetra Tech to A. DeSalvio, November 12, 2009.

Replace condition #5 with the following:

The owner/operator (O/O) shall establish an Inspection and Maintenance (I&M) program to determine, repair, and log leaks in HTF piping network and expansion tanks. I&M program and documentation shall be available to District staff upon request. The I&M program shall have at least the following components:

a. All pumps, compressors and pressure relief devices (pressure relief values or rupture disks) shall be electronically, audio, or visually inspected once every operating day.
b. All accessible valves, fittings, pressure relief devices (PRDs), hatches, pumps, compressors, etc. shall be inspected quarterly using leak detection devices such as a Foxboroe OVA 108 calibrate for methane.
c. VOC leaks greater than 100-ppmv shall be tagged (with date and concentration) and repaired within seven (7) calendar days of detection.
d. VOC leaks greater than 10,000-ppmv shall be tagged and repaired within 24-hours of detection.
e. The O/O shall maintain a log of all leaks exceeding 10,000-ppmv, including location, component type and repair made.
f. The O/O shall maintain records of the amount of HTF replaced on a monthly basis for a period of 5 years.
g. Any detected leaks exceeding 100-ppmv and not repaired in 7-days and 10,000-ppmv not repaired within 24-hours shall constitute a violation of this authority to Construct (ATC)/Permit to Operate (PTO)
h. The project owner shall place an adequate number of isolation valves in the Heat transfer Fluid (HTF) pipe loops so as to be able to isolate a solar panel collector loop in the event of a leak of fluid. These valves shall be actuated automatically, manually, and remotely, or locally as determined during detailed engineering design. The detailed engineering design drawings showing the number, location, and type of isolation valves shall be provided to the District for review and approval prior to the commencement of the solar array construction.

7. Cooling Tower ATC Condition #4 can be rewritten has follows:

   The operator shall perform weekly <u>specific</u> conductivity tests of the blow-down water total dissolved solids (TDS). <u>Quarterly tests of the blow-down water will be done to confirm the relationship between conductance and TDS.</u> The TDS shall not exceed 5,000 ppmv on a calendar monthly basis.

8. The applicant has submitted an application for the gasoline dispensing equipment. However the application doesn't include detail on the model or type of tank and vapor control equipment that it will meet CARB requirements.

9. The District will require the applicant to revise the emission calculations and HRA to include the criteria and toxic emissions from the Land Treatment Unit. The applicant will be allowed to use the emission estimates from the Solar Millennium Ridgecrest

Solar Power Project. The VOC estimates are 0.169 pounds per day and 0.031 tons per year.

10. The applicant needs to review each of the following emission sources and the list toxic substances and qualify the emissions (Note the application listed PAH as a substance emitted and may have included the individual PAHs.):

Emission Source	Substance	
	CAS	Name
Cooling Tower	67663	Chloroform
Boilers ICE	83329	Acenaphthene [PAH, POM]
	208968	Acenaphthylene [PAH, POM]
	120127	Anthracene [PAH, POM]
	56553	Benz[a]anthracene [PAH, POM]
	50328	Benzo[a]pyrene [PAH, POM]
	205992	Benzo[b]fluoranthene
	191242	Benzo[g,h,i]perylene [PAH, POM]
	207089	Benzo[k]fluoranthene [PAH, POM]
	53703	Dibenz[a,h]anthracene [PAH, POM]
	206440	Fluoranthene [PAH, POM]
	193395	Indeno[1,2,3-cd]pyrene [PAH, POM]
	85018	Phenanthrene [PAH, POM]
	129000	Pyrene [PAH, POM]
	25321226	Dichlorobenzenes (mixed isomers)
	7440508	Copper
	7440622	Vanadium (fume or dust)
	7440666	Zinc

11. The district will require the applicant to revise the HRA using the revised toxic emission plus the emissions from the Land Treatment Unit. The toxic emissions from the boilers have increase about 68 times since the values used for the original HRA. Furthermore the applicant will be required to submit all file in the format required by HARP.

12. Per Table 5.2-17 the maximum 1-hour NO_2 ambient air concentration from this project is 189.7 $\mu g/m^3$ and the proposed Federal NAAQS 1-hour NO_2 is 100 ppb or 189 $\mu g/m^3$.

Example

BACT Determination for HTF Expansion Tank/ Ullage System Emissions

The HTF expansion tanks are blanketed with nitrogen gas to keep the headspace in the expansion tanks non-explosive. The nitrogen may become saturated with VOC as it is in contact with the HTF and any volatile HTF breakdown products. When the HTF heats and expands, the nitrogen gas which is potentially saturated with VOC is vented. VOCs can generally be controlled through the use of the following technologies, depending on a number of factors, including flow rate, VOC concentration, moisture content, and the specific properties of the VOC involved. These technologies are not listed in order of control efficiency.

1. Closed Vapor System
2. Thermal oxidation
3. Regenerative thermal oxidation (RTO)
4. Carbon adsorption
5. Catalytic oxidation
6. A combination of technologies, such as a carbon adsorber concentrator followed by an oxidation technology
7. Refrigerated condenser

1. In a closed vapor system, when the HTF heats and expands, the VOC-saturated nitrogen will be captured, compressed, and stored in a small pressurized tank. When the HTF cools and contracts, the nitrogen is replaced from the pressurized tank. Ideally, this design serves to conserve nitrogen and completely eliminates VOC emissions from the expansion tanks. There have been some concerns raised by some engineering contractors regarding the safety of a closed vapor system such as this. While this approach almost completely eliminates VOC emissions and has been proposed at other solar thermal facilities, this has not been applied to full scale facility, and hence, not achieved in practice. Therefore a closed vapor system cannot be considered BACT.

2. Thermal oxidation uses high temperature combustion (1,200 °F – 2,400 °F) to control air pollutants in vapor streams. Capital equipment costs vary according to system size. Fuel requirements (costs) are generally higher than other oxidation technologies. Thermal oxidation usually works best when operated continuously; intermittent operation is impractical due to long heat up times for the combustion chamber, and frequent thermal

cycling stresses the refractory and shortens equipment life. Thermal oxidation is assumed to have a control efficiency of 95 or greater, but requires the combustion of fuel and thus would be a source of secondary (combustion) pollutants. Because the HTF venting is not a continuous process, the thermal oxidation is not well suited to the application and has been eliminated from further consideration as BACT.

3. RTO uses two or more heat exchangers to carry out oxidation and heat recovery. RTOs typically consume less energy than other oxidation processes and can recover 90 to 95 percent of the heat generated by oxidation. RTO control efficiencies are typically greater than 95 percent and can exceed 99 percent in some installations. RTOs are ideal for low- to moderate-VOC concentrations, high gas volume, and continuous operations. Because the HTF venting is not a continuous process, the RTO is not well suited to the application and has been eliminated from further consideration as BACT.

4. Carbon adsorption is a process where an activated carbon with high surface area is used to capture air pollutants. Single carbon beds typically are designed for 95 percent control, and multiple beds in series can achieve control efficiencies of 98 percent or more. Adsorption of the hydrocarbons proceeds until the carbon is saturated or spent. Then the carbon must either be regenerated or replaced. Carbon adsorption can be an expensive control technology for high concentration and/or high volume vapor streams.

5. Catalytic oxidation uses a metal catalyst to lower the temperature range for oxidation of VOC to 550°F - 650°F. Therefore, catalytic oxidation can be more cost-effective than direct thermal oxidation for vapor streams with low heat content. Control efficiencies are comparable to thermal oxidation. Similar to thermal oxidation, catalytic oxidation requires the combustion of fuel and thus would be a source of secondary (combustion) pollutants. The catalyst bed is prone to poisoning under certain circumstances.

6. The combination of carbon adsorption followed by an oxidation technology is ideally suited to a vent stream with high gas volumes and low VOC concentrations, which matches the source parameters of the HTF ullage system. Because the principle mechanism for emissions control is carbon adsorption, the control efficiency is expected to be the same as carbon adsorption alone. The difference between this alternative and carbon alone is the manner in which the carbon is regenerated. With the combination

technology, the carbon is regenerated onsite with hot air and the resulting air/vapor stream processed in a thermal oxidizer to destroy VOC. Like all other thermal oxidizers, this technology causes emissions of secondary pollutants from the combustion of fuel and VOC. Typically, the selection of this technology over carbon alone is due to an economic advantage of onsite regeneration (as opposed to offsite regeneration for a fee that is typical of carbon alone).

7. A refrigerated or water-cooled condenser is a control option that can be used to condense the VOC vapors leaving the HTF expansion tanks. The control efficiency of a refrigerated or water-cooled condenser depends on the vapor pressure of the VOC and the temperature of the coolant. Control efficiencies are typically lower than other VOC control technologies. Due to the very low vapor pressure of HTF at ambient temperature, the control efficiency of a water-cooled condenser is expected to exceed 99 percent for HTF; however, byproducts of thermal degradation of the HTF may include benzene and other light hydrocarbons. The control efficiency of a water-cooled condenser for benzene would be substantially lower. Because the control efficiency of the water-cooled condenser for benzene is substantially lower than either the carbon adsorption or the oxidation technologies, the water-cooled condenser doesn't satisfy BACT and is rejected for this application.

BSPP is proposing to use two-stage condensing system with carbon absorption to reclaim usable HTF liquids and control VOC emissions to a maximum of 1.5 lb/day from each HTF vent. The mixture of gas containing VOCs from the expansion vessel enters the ullage system, which contains a certain level of HTF at any time. The HTF vapor within the gas mixture condenses and is recirculated to the HTF cycle. If necessary, the HTF content of the first ullage vessel is cooled by recirculation via an air cooler. Leaving the first ullage vessel, residual mixture of gas enters the second ullage vessel, where it will be further condensed. The content of the second ullage vessel is cooled by recirculation via a second air cooler. By cooling, the hydrocarbons within the gaseous mixture condense to a large extent and are collected in the ullage drain vessel. Residual gaseous components are vented to the vessel pit through a series of two active carbon beds, which are expected to reduce VOC emissions by 98 percent. The volume of collected liquid residuals and vented gas will depend upon the final operating temperature during the previous day of operation and the temperature of the system overnight.