ADAMS BROADWELL JOSEPH & CARDOZO
A PROFESSIONAL CORPORATION

ATTORNEYS AT LAW

601 GATEWAY BOULEVARD, SUITE 1000
SOUTH SAN FRANCISCO, CA 94080-7037

TEL: (650) 589-1660
FAX: (650) 589-5062
jholder@adamsbroadwell.com

DANIEL L. CARDOZO
THOMAS A. ENSLOW
TANYA A. GULESSERIAN
JASON W. HOLDER
MARC D. JOSEPH
ELIZABETH KLEBANER
RACHAEL E. KOSS
LOULENA A. MILES
ROBYN C. PURCHIA

FELLOW
AARON G. EZROJ

OF COUNSEL
THOMAS R. ADAMS
ANN BROADWELL
GLORIA D. SMITH

SACRAMENTO OFFICE

520 CAPITOL MALL, SUITE 350
SACRAMENTO, CA 95814-4721

TEL: (916) 444-6201
FAX: (916) 444-6209

May 25, 2010

California Energy Commission
Attn: Docket No. 09AFC7
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

Re: 09-AFC-7 Palen Solar Power Project

Dear Docket Clerk:

Enclosed are an original and one copy of RESUBMITTAL OF CALIFORNIA UNIONS FOR RELIABLE ENERGY'S COMMENTS ON THE PRELIMINARY DETERMINATION OF COMPLIANCE. Although the Comments originally emailed were complete, the mailed copies, and the copy docketed, omitted the actual Comments and just contained the docket office cover sheet, the exhibits and the proof of service. The Comments are attached to this version.

Please process the document and provide us with a conformed copy in the envelope enclosed.

Thank you.

Sincerely,

/s/

Jason W. Holder

JWH:bh
Enclosures

2357-030a

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A PROFESSIONAL CORPORATION

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601 GATEWAY BOULEVARD, SUITE 1000
SOUTH SAN FRANCISCO, CA 94080-7037

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FAX: (650) 589-5062
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520 CAPITOL MALL, SUITE 350
SACRAMENTO, CA 95814-4721

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FAX: (916) 444-6209

May 14, 2010

California Energy Commission
Attn: Docket No. 09AFC7
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

Re: <u>09-AFC-7 Palen Solar Power Project</u>

Dear Docket Clerk:

Enclosed are an original and one copy of CALIFORNIA UNIONS FOR RELIABLE ENERGY'S COMMENTS ON THE PRELIMINARY DETERMINATION OF COMPLIANCE. Please process the document and provide us with a conformed copy in the envelope enclosed.

Thank you.

Sincerely,

/s/

Jason W. Holder

JWH:bh
Enclosures

2357-029a

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A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
601 GATEWAY BOULEVARD, SUITE 1000
SOUTH SAN FRANCISCO, CA 94080-7037
TEL: (650) 589-1660
FAX: (650) 589-5062
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ROBYN C. PURCHIA

OF COUNSEL
THOMAS R. ADAMS
ANN BROADWELL
GLORIA D. SMITH

SACRAMENTO OFFICE
520 CAPITOL MALL, SUITE 350
SACRAMENTO, CA 95814-4721
TEL: (916) 444-6201
FAX: (916) 444-6209

May 14, 2010

Via Email and U.S. Mail

Mohsen Nazemi
Deputy Executive Officer
South Coast Air Quality Management District
21865 Copley Dr.
Diamond Bar, CA 91765
Mnazemi1@aqmd.gov

John Yee
Senior Engineer
South Coast Air Quality Management District
21865 E. Copley Drive
Diamond Bar, CA 91765-4182
jyee@aqmd.gov

Re: Comments on the Preliminary Determination of Compliance for the Solar Millennium Palen Solar Power Project (No. 163054)

Dear Mr. Nazemi and Mr. Yee:

We represent California Unions for Reliable Energy ("CURE"). CURE is a party to the Solar Millennium Palen Solar Power Project ("Project") licensing case before the California Energy Commission ("CEC").[1] The District published notice of the preliminary determination of compliance ("PDOC") for the Project, effective April 15, 2010. We submit these comments concerning the PDOC within the 30-day public review period. These comments were prepared with the assistance of Petra Pless D.Env.[2]

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1 Application for Certification for the Palen Solar Power Project ("AFC"), California Energy Commission Docket No, 09-AFC-07, August 24, 2009.

2 Dr. Pless has prepared a separate comment letter regarding the PDOC. *See* Exhibit A. These comments are incorporated herein by reference.

CURE is an association of labor unions whose members build, operate and maintain commercial, residential and industrial projects, including power plants. CURE and its members are interested in sustainable economic development. Continued environmental degradation may jeopardize future jobs by making it more difficult and more expensive for business and industry to expand in Riverside County, and by making it less desirable to live there. Continued degradation can, and has, caused construction moratoriums and other growth restrictions which, in turn, reduce future employment opportunities.

Additionally, union members live in and use the areas that suffer the impacts of environmentally detrimental projects. CURE and its members therefore have an interest in enforcing environmental laws. CURE and its members are also concerned about projects that cause serious environmental harm without providing countervailing economic advantages, such as decent wages and benefits.

The Project was jointly proposed by Chevron Energy Solutions ("Chevron") and Solar Millennium, LLC. However, Chevron has since withdrawn from the Project. The Project applicant has requested that the District issue one permit for the two power blocks to a project-specific company known as Palen Solar I, LLC, a wholly owned subsidiary of Solar Millennium, LLC.

Our comments below describe the inadequacies we have observed concerning the PDOC. In sum, the District (1) fails to properly determine offset applicability for the Project, (2) did not provide adequate documentation of its analyses, (3) fails to include the Project's auxiliary cooling towers and HTF piping system, and (4) omits permit conditions that ensure that the Project's emergency generators satisfy the best available control technology ("BACT") pursuant to District Rule. These deficiencies require that the District issue a Revised PDOC.[3]

[3] While the date listed in the header of the PDOC is January 19, 2010, e-mail correspondence produced by the District in response to our Public Records Act ("PRA") request indicates that the PDOC was revised in February 2010. (*See* Exhibit B: e-mail from Ken Coats to John Yee regarding revisions to the PDOC.) We request, therefore, that the District confirm that the PDOC attached to the notice of publication is the final version.

A. The PDOC Underestimates VOC Emissions from the Heat Transfer Fluid System and the Bioremediation Farm and, as a Result, Potentially Fails to Require Offsets

1. The District's Determination of Emission Factors for Fugitive VOC Emissions from the Heat Transfer Fluid Systems and Bioremediation Unit Is Erroneous

The District's estimates of fugitive VOC emissions from the heat transfer fluid ("HTF") systems are based on emission factors for "Heavy Liquid" contained in the U.S. EPA's 1995 Protocol for Equipment Leak Emission Estimates.[4] The emission factors for Heavy Liquid are not appropriate for all hours of operation of the Project's HTF systems because during the day when the HTF is heated to high temperatures (well above its boiling point of 495° F), the HTF expands, resulting in a considerably lower density and, thus, increased volatility and higher VOC emissions.[5] In addition, while the District calculates the VOC emissions from the HTF piping system, it does not permit the piping system units.

Recently, CEC staff notified permitting engineers at several air districts, including the SCAQMD, of the need for a unified methodology to estimate VOC emissions from the HTF systems at solar plants, suggesting several methodologies that take into account the fluid's increased vapor pressure at higher temperatures.[6] Despite receiving this detailed communication recommending a defensible and rational approach to analyzing these VOC emissions, the SCAQMD has insisted on using a simplistic approach that does not take into account the increased vapor pressure of HTF at the daytime operating temperature of 750° F.

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[4] PDOC, p. 16; the 1995 Protocol is available online at: http://www.epa.gov/ttnchie1/efdocs/equiplks.pdf. Dr. Pless describes the origin, assumptions, and limitations of the 1995 Protocol in her comments. *See* Exhibit A, p. 2.

[5] *See* Exhibit A, p. 3, Figure 1; *see also* Exhibit C, Technical Bulletin 7539115B, Therminol VP-1; *see also* https://team.solutia.com/sites/msds/Therminol%20MSDS%20Documents/211WEN.pdf; *see also* http://www.therminol.com/pages/products/eu/vp-1.asp.

[6] *See* Exhibit D: Will Walters, Aspen Environmental Group, Email to Solar Project Permitting Engineers, Kern County Air Pollution Control District, Mojave Desert Air Quality Management District, South Coast Air Quality Management District, San Joaquin Valley Air Pollution Control District, Re: Solar Thermal Projects – Methodology Consensus – HTF emissions comparison for the Five Fast Track Solar Projects and Beacon, January 25, 1010.

For the proposed Solar Millennium Ridgecrest Solar Power Project ("Ridgecrest Project"), CEC staff recommended calculating emissions based on emission factors for light liquids for valves, pump seals and connectors and for gas for the pressure relief valves for 16 hours per day and for heavy liquids for all components for 8 hours per day.[7] For the 250-MW Ridgecrest Project power block, which has an identical configuration as each of the Project's proposed dual power blocks, fugitive VOC emissions from the HTF piping system are estimated at 46.432 lbs/day and 8.474 tons/year.[8] For the Palen Project's two identical[9] 250-MW power blocks, fugitive VOC emissions from the HTF piping system can thus be estimated at 92.864 lbs/day and 16.948 tons/year.

As discussed in the PDOC, the Project will use two land treatment units to bioremediate or land farm soil contaminated with HTF.[10] The HTF-contaminated soil will also result in fugitive emissions of VOCs. Fugitive VOC emissions from the land treatment unit at a facility with an identical equipment list for its 250-MW power block as proposed for each of the Project's power blocks, the proposed Ridgecrest Project, have been estimated at 0.169 pounds per day ("lbs/day") and 0.031 tons/year for one 250-MW power block.[11] Thus, VOC emissions from the land treatment units serving the Project's two power blocks can be estimated at 0.338 lbs/day and 0.062 tons/year.

These estimates do not include the emissions that would be caused by land treatment for potential large-scale spills of HTF. Approximately 1,300,000 gallons of HTF will be stored at the Project site, contained in the pipes and the heat exchanger.[12] Experience at other solar trough facilities has shown that spills are

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[7] *See* Exhibit E, excerpts from PDOC for Ridgecrest Project, Emissions Calculations, p. 43.

[8] *See Id.* at p. 44.

[9] The component counts for the Project's two HTF systems are identical to the component count for the Ridgecrest Project's single HTF system. *See* Exhibit B, p. 3.

[10] PDOC, pp. 9, 20.

[11] *See* Exhibit E, excerpts from PDOC for Ridgecrest Project, Emissions Calculations, p. 46.

The PDOC for the Ridgecrest Project is available at: http://www.energy.ca.gov/sitingcases/solar_millennium_ridgecrest/documents/others/2010-03-18_Kern_APCD_PDOC_Engineering_Evaluation_TN%20-5973.pdf.

[12] Staff Assessment/Environmental Impact Statement ("SA/EIS") for the Project, p. C.4-7.

common and on the order of 30 to 250 gallons per event.[13] Current total plant loss of heat transfer fluid at the Kramer Junction, CA, Solar Energy Generating Systems ("SEGS") III through VII facilities through volatilization, spills, and leaks is estimated at about 0.5% per year.[14] Thus, based on experience at other facilities, the Project could experience an annual loss of about 6,500 gallons of HTF. As admitted by the Applicant in response to CEC's expressed concerns, the potential for spills may be exacerbated here due to flood risks caused by the Project's proximity to a large wash from the Chuckwalla Mountains to the south.[15] The PDOC must be revised to contain an accurate and conservative estimate of VOC emissions from the potentially large quantity of HTF that may be treated within land treatment unit.

2. The PDOC Does Not Comply with District Rules Requiring a Determination of Offsets

The PDOC states that the Project is exempt from the offsets requirement under Rule 1304 (d)(1)(A).[16] However, as discussed, the Project's emissions, will substantially exceed the maximum threshold for VOC emissions of 4 tons/year set forth in Table A in Rule 1304 (d)(1)(A). Therefore, the new facility is not exempt from the requirement to obtain offsets.

In addition to the Project's VOC emissions from the boilers, emergency engines, and the HTF ullage system vents (2.26 tons/year[17]), the Project's HTF piping system and two land treatment units will also have VOC emissions (approximately 17 tons/year). Thus, *total VOC emissions from the Project, without*

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13 Governor's Office of Emergency Services ("OES"), Hazardous Materials Spill Report, available at: http://www.oes.ca.gov/operational/malhaz.nsf/. Several events reported to the OES involved spills of several hundred gallons of HTF. *Ibid.*

14 Gilbert E. Cohen, KJC Operating Company, David W. Kearney, Kearney & Associates, and Gregory J. Kolb, Sandia National Laboratories, Solar Thermal Technology Department, Final Report on The Operation and Maintenance Improvement Program for Concentrating Solar Power Plants, SAND99-1290, June 1999; p. 30 and Appendix Z, Fugitive Emissions.

15 See Applicant's Response to Data Request DR-S&W-249 ["If a large storm event were allowed to come on to the site it would likely reshape the swales between the solar collectors, damage the terraces, affect the HTF Pipe Supports (which could cause spills of fluid) and possibly impact the site roadways"].

16 PDOC, p. 21; see also *Id.* at 13, fn. 1.

17 *See* PDOC, Table 9, p. 17.

considering VOC emissions caused by possible spills, is estimated at ***19.26 tons/year***, *well above the 4 tons/year threshold for offsets.*

Based on the methodology suggested by CEC staff and adopted by other air districts, the estimated VOC emissions from the Project's HTF system alone substantially exceeds the 4 tons/year threshold. Thus, the PDOC must be revised based on a methodology that reflects the increased volatility of the HTF fluid at higher temperatures. If estimated fugitive VOC emissions from the Project are extrapolated from component count data from other facilities using parabolic troughs, the Revised PDOC must describe in detail the methodology for such extrapolation. The Revised PDOC must credibly demonstrate that emissions of fugitive VOCs will be below the 4 tons/year threshold for offsets or, if emissions exceed the threshold, demonstrate that VOC offsets are real, enforceable, surplus, permanent and quantifiable.[18] If offsets are required, the PDOC must provide sufficient information to enable meaningful review of the offset exemption by the California Air Resources Board ("CARB"), U.S. EPA and the public.[19] A new PDOC that meets the requirements of the District's rules must be circulated for comment before a final determination of compliance ("FDOC") can be issued.

Notably, it may not be possible for the District to comply with the requirements of Rule 1303(b)(2) until the moratorium on the District's offsets bank is lifted.[20] The District currently has *no* banked emission reduction credits ("ERCs") eligible for use for uses that do not provide essential public services.[21] If offsets are required for the Project, until the District has approved an ERC application and makes the associated permit modifications, and the Applicant proposes to use those ERCs as part of its offset package, the District cannot circulate a PDOC for comment or approve the use of offsets. In sum, the Revised PDOC must address the availability of offsets for the Project.

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[18] District Rule 1309 (b)(4)(A)-(D).

[19] District Rule 1310 (c).

[20] *See Natural Resources Defense Council v. South Coast Air Quality Management District (Super. Ct. Los Angeles County*, 2007, No. BS 110792).

[21] Health and Safety Code, § 40440.13, subd. (a).

B. The District's Analysis Is Inconsistent and Not Adequately Supported

The PDOC suffers from a lack of adequate documentation and is inconsistent and ill-defined. For example, the District presents Tables with emission estimates without providing the underlying calculations. In addition, some of these Tables are missing all necessary units of measurement, contain vague descriptions, or fail to provide a definition of abbreviations or acronyms.[22] Further, the District refers to the results of an ambient air quality modeling and a health risk assessment but fails to provide any supporting documentation.[23] This lack of adequate documentation unnecessarily impedes review of the PDOC and deprives the reviewer of the opportunity to evaluate the District's assumptions for the modeling runs.

Finally, the PDOC is inconsistent in its presentation of emission estimates. For most equipment, the PDOC first presents a table with emission estimates for one unit, e.g., one boiler or one emergency generator, and then a summary table with emission estimates for all such units at the facility, e.g., two boilers or two emergency generators. The PDOC fails to present such a summary table for the Project's two HTF ullage systems/fugitive emissions.

C. The Revised PDOC Must Analyze and Permit the Project's Land Treatment Units

The PDOC must include adequate permit conditions that fully comply with the detailed requirements set forth in District Rule 1166. The PDOC does not adequately provide for mitigation of VOCs that would result from land farming HTF-contaminated soil. Instead, the PDOC defers the formulation of mitigation by requiring the Project to operate "pursuant to a mitigation plan approved by the Executive Officer and applying the appropriate control measures, which may include covering the pile or applying a wetting agent."[24] Such vague terms fail to

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[22] For example, PDOC, Table 9, p. 17 does not include units for annual emissions (lb/yr) and 30-day average emissions (lb/day); PDOC, Table 2 through 7 refer to "hourly emissions" or "hourly" instead of "average hourly emissions"; PDOC, Table 8, p. 16 refers to "R1" and "R2" without defining these acronyms.

[23] PDOC, p. 22.

[24] PDOC, p. 20.

satisfy the requirement to establish enforceable mitigation measures with specific performance standards to address Project impacts.

D. Depending on the Purchase Date of Project Emergency Generators, U.S. EPA Tier 4 Emission Factors May Apply Rather than the Tier 2 Emissions Factors Applied in the PDOC

The PDOC determines that BACT for the two 2,922-brakehorse power ("bhp") diesel emergency generators is met by using units that comply with the U.S. EPA's Tier 2 emission factors. However, Tier 2 for these types of engines expires at the end of 2010 and Tier 4 with considerably lower emission factors will become effective in 2011. The PDOC does not require that the Applicant purchase the emergency diesel generators before the end of 2010. The PDOC must be revised to contain a permit condition specifying that the Applicant must purchase emergency generators that comply with the U.S. EPA's Tier 4 standard if the equipment is not ordered until 2011. The Revised PDOC must include emissions estimates and specify compliance testing based on the appropriate emission factors, *i.e.* Tier 2 or Tier 4, depending on the purchase date.

E. The District's Emission Calculations Fail to Account for All Toxic Air Contaminant Emissions

The District provides a summary of emission estimates and results of a health risk assessment for emissions of 23 toxic air contaminants.[25] The District fails to account for a number of toxic air contaminant emissions, including emission of acetaldehyde, acrolein, 1-3 butadiene, and xylene from the emergency generators and fire pumps and emissions of arsenic, cadmium, manganese and manganese compounds, mercury and mercury compounds, and nickel from the boilers. The Revised PDOC must account for these toxic air contaminant emissions.

F. The PDOC Fails to Impose All Conditions

The PDOC relies on a number of assumptions for its emission estimates that are not adequately reflected in permit conditions. For example, the PDOC assumes that the HTF ullage system would be vented approximately 400 hours per year. Yet, the PDOC fails to impose a permit condition that would ensure that the HTF ullage systems would indeed not be vented more than 400 hours per year.

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[25] PDOC, p. 18.

G. Conclusion

The PDOC is based on technical errors and omissions that must be addressed prior to Project certification. Most significantly, the PDOC does not address the offsets that would most likely be required due to the Project's substantial VOC emissions. The District must withdraw the PDOC, address the technical errors in the District's analysis, and reissue a Revised PDOC for public review and comment prior to issuing a Final Determination of Compliance.

Thank you for considering CURE's comments regarding the PDOC. Please contact me with any questions you may have regarding the issues raised in this letter or in the attached comments from Dr. Pless.

Sincerely,

Jason W. Holder

JWH:bh
Attachments

cc: (Via Email and U.S. Mail)
Ken Coats, Engineering & Compliance, SCAQMD
Alan Solomon
Raoul Renaud, Hearing Officer
California Energy Commission Docket Unit (09-AFC-07)

EXHIBIT A

Pless Environmental, Inc.
440 Nova Albion Way, Suite 2
San Rafael, CA 94903
(415) 492-2131 voice
(815) 572-8600 fax

BY EMAIL

May 13, 2010

Jason W. Holder
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080-7037

Re: Review of Preliminary Determination of Compliance for Palen Solar Electric Power Project (Application No. 502597)

Dear Mr. Holder,

Per your request, I have reviewed the Preliminary Determination of Compliance ("Draft EIR") published by the South Coast Air Quality Management District ("SCAQMD" or "District") for Palen Solar Electric Power Project ("Project") to be located off Corn Springs Road, Desert Center, CA 92239. The Project, a 500-MW parabolic trough solar thermal plant, was initially jointly proposed by Chevron Energy Solutions ("Chevron") and Solar Millennium, LLC as two adjacent but independent, identical 250-MW facilities with identical equipment. However, Chevron has since withdrawn from the Project. Subsequently, Solar Millennium, LLC requested that the District issue one permit for the two 250-MW power blocks to a project-specific company known as Palen Solar I, LLC ("the Applicant"), a wholly owned subsidiary of Solar Millennium, LLC.

My comments below describe the inadequacies I have observed concerning the PDOC. In sum, the PDOC (1) incorrectly determines emissions of volatile organic compounds ("VOCs") from the Project's heat transfer fluid ("HTF") systems and, as a result, fails to determine offset applicability for the Project; (2) fails to include emissions from the Project's auxiliary cooling towers; (3) fails to include all toxic air contaminants in its emission estimates; and (4) did not provide adequate documentation of its analyses. I recommend that the District revise the PDOC to address these issues and redistribute the document for public review.

I. The PDOC Underestimates Fugitive VOC Emissions from the Heat Transfer Fluid System and, as a Result, Fails to Require Offsets

The Project would use Therminol VP-1 by Solutia, Inc. as the HTF in its solar fields. Therminol VP-1 is a eutectic[1] mixture consisting of 26.5% biphenyl and 73.5% diphenyl ether (a.k.a. diphenyl oxide).[2] This HTF flowing through miles of pipes in the solar fields would result in fugitive losses from piping components such as pumps, seals, flanges, valves, and connectors. These hydrocarbon emissions are considered VOCs and reactive organic compounds ("ROGs").

The District estimates fugitive VOC emissions from the Project's HTF systems based on emission factors contained in the U.S. EPA's *1995 Protocol for Equipment Leak Emission Estimates*.[3] The District's approach is problematic.

The emission factors contained in the U.S. EPA's *1995 Protocol for Equipment Leak Emission Estimates* are based on field measurements conducted in the 1970s through early 1990s at petroleum refineries, marketing terminals, oil and gas production operations, and ethylene and butadiene producers as representatives for the Synthetic Organic Chemical Manufacturing Industry ("SOCMI"). The study found a statistical correlation between mass emission rates from equipment and a) the process stream (service) and b) the relative volatility of the liquid/gas streams. This finding led to the separation of data for valves, pumps, and pressure relief valves by type of service, which were defined as:

- Gas/vapor - material in a gaseous state at operating conditions;
- Light liquid - material in a liquid state in which the sum of the concentration of individual constituents with a vapor pressure over 0.3 kilopascals (kPa) at 20°C [68°F] is greater than or equal to 20 weight percent; and
- Heavy liquid - not in gas/vapor service or light liquid service.[4]

The U.S. EPA developed emission factors for each of these three service categories separately for a) refineries, and b) marketing terminals, and c) oil and gas production operations, and d) SOCMI. The District used SOCMI average emission factors for "Heavy Liquid"[5] to estimate fugitive emissions from the Project's HTF

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[1] A eutectic system is a mixture of chemical compounds or elements that has a single chemical composition that solidifies at a lower temperature than any other composition.

[2] Solutia Inc., Therminol VP-1, Material Safety Data Sheet, My 16, 2009; https://team.solutia.com/sites/msds/Therminol%20MSDS%20Documents/211WEN.pdf, accessed May 13, 2010; attached as Exhibit A.

[3] PDOC, p. 16.

[4] U.S. Environmental Protection Agency, 1995 Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, November 1995, p. 2-7; http://www.epa.gov/ttnchie1/efdocs/equiplks.pdf.

[5] The PDOC uses the term "Heavy Oil," which is appropriate for the gas and petroleum industry.

systems based on the assumption that the HTF has a very low vapor pressure below 300°F.[6]

However, the HTF daily operating range cycles between approximately 430°F and 740°F every day;[7] during normal operation, HTF enters the solar field at 565°F and leaves the field at 739°F.[8] Thus, for most of the day and during normal operation, the operating temperature is above the normal boiling point of the HTF of 495°F.[9] The vapor pressure at these operating temperatures rises drastically and ranges from about 40 kilopascals ("kPA") at 430°F to about 220 kPA at 565°F and 900 kPA at 740°F, as shown in Figure 1.[10]

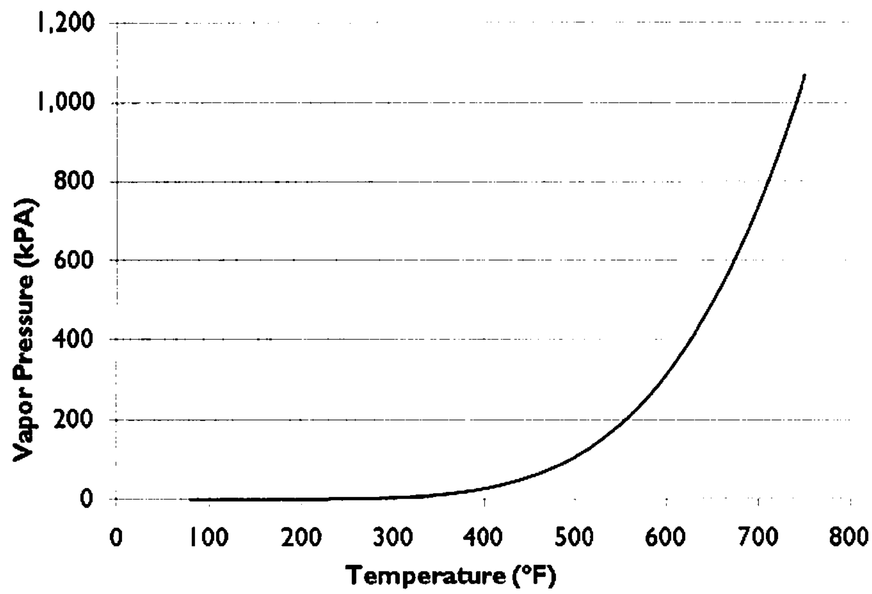

Figure 1: Therminol VP-1 Temperature vs. Vapor Pressure
(data from Solutia Technical Bulletin 7239115B, 1999)

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[6] PDOC, p. 16.

[7] *See*, for example, Abengoa Solar, Inc., Mojave Solar Project, Second Supplemental Response to Data Request Set 1A, February 2, 2010, p. 10; http://www.energy.ca.gov/sitingcases/abengoa/documents/applicant/2010-02-02_2nd_Supplemental_Response_to_Data_Request_Set_1A_TN-55150.pdf.

[8] PDOC, p. 5.

[9] Solutia Inc., Therminol VP-1, Material Safety Data Sheet, My 16, 2009; https://team.solutia.com/sites/msds/Therminol%20MSDS%20Documents/211WEN.pdf, accessed May 13, 2010.

[10] Solutia, Therminol VP-1, Vapor Phase/Liquid Phase Heat Transfer Fluid, 54°F to 750°F, Technical Bulletin 7239115B, 1999; http://seungguk.co.kr/img/product/THERMINOLVP1.pdf, accessed May 13, 2010.

Further, as the HTF is cycled within the indicated temperature range, degradation of the HTF occurs resulting primarily in phenol, and benzene with smaller concentrations of benzene, phenol, and small amounts of naphthalene, methane, ethane, and toluene.[11] These compounds have lower boiling points and higher vapor pressure.

Because the HTF expands with increasing temperature ad is contained in the HTF system piping, the system pressure rises to a maximum of about 40 bars while the fluid is pumped through the solar fields. Under these fluid conditions, *i.e.*, high operating temperatures and high system pressure, any release of HTF from piping components would spontaneously occur in gaseous form.

Thus, because the HTF piping system does not operate under atmospheric conditions (68°F and 1 bar), the SOCMI emission factors for "Heavy Liquid" are not appropriate for calculating fugitive VOC emissions from the Project's solar fields. Rather, the emission estimates should be based on emission factors for "Light Liquid" and "Gas". (Of course, it would be far preferable to conduct field measurements at existing solar trough plants, *e.g.*, the SEGS plants at Kramer Junction, CA, rather than relying on average SOCMI emission factors conducted at industries with entirely different operating conditions.)

Recognizing this issue and the inconsistency with which emissions are calculated for the same type of equipment at various solar trough power plants, the California Energy Commission ("CEC") staff recently notified permitting engineers at several air districts, including the SCAQMD, of the need for a unified methodology to estimate VOC emissions from the HTF systems, suggesting several methodologies that take into account the fluid's increased vapor pressure at higher temperatures.[12]

The Kern County Air Pollution Control District ("KCAPCD") followed one of Staff's recommended approaches and estimated emissions for the proposed 250-MW Solar Millennium Ridgecrest Solar Power Project ("Ridgecrest Project") based on emission factors for light liquids for valves, pump seals and connectors and for gas for the pressure relief valves for 16 hours per day and for heavy liquids for all components for 8 hours per day.[13] For the Ridgecrest Project power block, fugitive VOC emissions from the HTF piping system are estimated at 46.432 lbs/day and 8.474 tons/year.[14]

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[11] Conrad Gamble, Solutia, Inc., E-mail to Jared Foster, Worley Parsons, Ltd., Re: Therminol VP-1 Information, January 28, 2008; attachment to Response to CEC Data Request PH-176, January 6, 2010.

[12] *See* Will Walters, Aspen Environmental Group, Email to Solar Project Permitting Engineers, Kern County Air Pollution Control District, Mojave Desert Air Quality Management District, South Coast Air Quality Management District, San Joaquin Valley Air Pollution Control District, Re: Solar Thermal Projects - Methodology Consensus - HTF emissions comparison for the Five Fast Track Solar Projects and Beacon, January 25, 1010.

[13] *See* Exhibit B, excerpts from PDOC for Ridgecrest Project, Emissions Calculations, p. 43.

[14] *See Id.* at p. 44.

Following the same approach, fugitive VOC emissions from the HTF piping systems associated with the Palen Project's two identical[15] 250-MW power blocks, can thus be estimated at 92.864 lbs/day and 16.948 tons/year. The annual emissions by far exceed the SCAQMD's offset threshold of 4 tons/year set forth in Rule 1304 (d)(1)(A), thus, requiring that the Project secure offsets.

II. The PDOC Fails to Analyze and Permit the Project's Auxiliary Equipment Cooling Towers

The Project will utilize dry cooling for the primary steam cycle, but will employ two two-cell wet cooling towers for cooling auxiliary equipment including the steam turbine generator ("STG") lubrication cooler, the STG generator cooler, steam cycle sample coolers, large pumps, etc.[16] Wet cooling towers are sources of particulate matter emissions. The PDOC does not list the Project's two auxiliary equipment cooling towers nor does it include emission estimates for this equipment.

Emissions from the auxiliary equipment cooling towers for both power blocks have been estimated at 0.97 pounds per day ("lb/day") and 0.11 tons per year ("ton/yr") of particulate matter equal to or smaller than 10 micrometers ("PM10") and 2.5 micrometers ("PM2.5").[17] The PDOC must be revised to contain a discussion of the auxiliary cooling towers, provide emissions in the estimates for total Project emissions, and include permit conditions for the hours of operation, maximum drift eliminator loss, and total dissolved solids ("TDS") content of the circulating water.

The PDOC should be revised to include emission estimates and permit conditions for the Project's auxiliary equipment cooling towers.

III. The District's Emission Calculations Fail to Account for All Toxic Air Contaminant Emissions

The District provides a summary of emission estimates and results of a health risk assessment for emissions of 23 toxic air contaminants.[18] However, the District fails to account for a number of toxic air contaminant emissions, including emission of acetaldehyde, acrolein, 1-3 butadiene, and xylene from the emergency generators and fire pumps and emissions of arsenic, cadmium, manganese and manganese compounds, mercury and mercury compounds, and nickel from the boilers. The PDOC should be revised to account for these toxic air contaminant emissions.

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[15] The component counts for each of the Project's two HTF systems are identical to the component count for the Ridgecrest Project's single HTF system.

[16] AFC, p. 2-5 and p. 5.2-27; SA/DEIS, pp. B.1-6 and D.1-7, Facility Design Table 2.

[17] *See* SA/DEIS, p. C.1-19, Tables 8 and 9.

[18] PDOC, p. 18.

IV. The PDOC Is Inconsistent and Not Adequately Supported

There are several instances where the PDOC does not adequately define or characterize the provided information or provides erroneous information:

- Tables 2 through 7: "hourly emissions" should be revised to "average hourly;"
- Tables 2, 3, 4, 5, 6, and 7: "annual" should be revised to "average annual;"
- Tables 2, 3, 4, 5, 6, 7, and 8: "30-DA" should be defined as "30-day average;"
- Tables 4 and 5: the estimates for PM2.5 and SOx emissions from the emergency fire pump engines are transposed;
- Table 8: "AA" should be defined as "annual average;"
- Tables 8 and 10 lack a definition of "R1" and "R2,"which presumably stand for "uncontrolled" and "controlled;"
- Table 9 lacks units of measurement for annual emissions (lb/year for individual sources; lb/day for "Facility 30DA");
- Table 10 fails to clarify whether hourly and annual emissions are average or maximum; and
- The PDOC presents a table for VOC emissions from one HTF system (Table 8) associated with one power block but fails to provide a summary table for the Project's two HTF systems.

These instances should be revised and amended.

Further, the District refers to the results of an ambient air quality modeling and a health risk assessment but fails to provide any supporting documentation.[19] This lack of adequate documentation unnecessarily impedes review of the PDOC and deprives the reviewer of the opportunity to evaluate the District's assumptions for its calculations and modeling runs.

Conclusion

As discussed above, the PDOC's emission estimates suffer from a number of incorrect assumptions and omissions. As a result, the District fails to determine offset applicability for the Project. In addition, the PDOC fails to quantify particulate matter emissions from the Project's auxiliary equipment cooling towers. Further, the PDOC's estimates of toxic air contaminants does not include all compounds emitted from the Project's diesel generators and boilers. Finally, the PDOC's presentation is flawed and is

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[19] PDOC, p. 22.

not adequately supported. I recommend that the PDOC be revised to address these issues and recirculated for public review.

Please feel free to call me at (415) 492-2131 or e-mail at petra@ppless.com if you have any questions about the comments in this letter.

Regards,

Petra Pless, D.Env.

Enclosures

EXHIBIT B

Ken Coats

From:	Ken Coats
Sent:	Wednesday, February 03, 2010 10:02 AM
To:	'WWalters@aspeneg.com'
Cc:	John Yee
Subject:	Update on Palen Project

Hi Will

Thanks for your phone message today. I did receive the package from AECOM regarding the proposed changes to the Palen Project, namely the elimination of the HTF heaters , the increase in engine BHP and the combining of both facilities into one common entity. I have delivered the package to Permit Services for pre-processing, and I will contact you when we have an ID number for the new facility. We will however, have to make some logistical adjustments on our end regarding the combining of the facilities since the permits have not yet been issued. The PDOC is about 25% complete as of today. I will keep you posted on any additional developments. Please call me if you have any questions. I will be out of the office from 2/4 and returning on 2/9.

Thanks,

Ken

EXHIBIT C

Technical Bulletin 7239115B
(Supersedes 7239115A)

THERMINOL® VP-1

Heat Transfer Fluid by **Solutia**

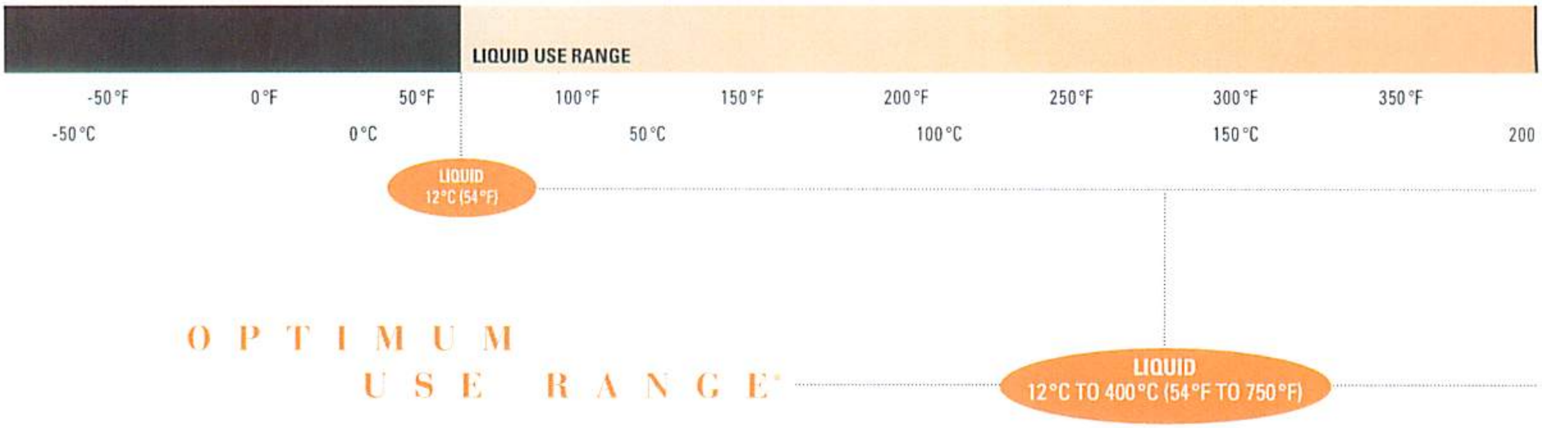
Vapor Phase/ Liquid Phase Heat Transfer Fluid

54°F to 750°F

+400°C
+700°F
+350°C
+600°F
+300°C
+500°F
+250°C
+400°F
+200°C
+150°C +300°F
+100°C
+200°F
+50°C
+100°F
0°C
0°F
-50°C
-100°F

VAPOR USE RANGE

LIQUID USE RANGE



OPTIMUM USE RANGE*

Therminol® VP-1 heat transfer fluid is specifically designed to meet the demanding requirements of vapor phase systems. It combines exceptional heat stability and low viscosity for efficient, dependable, uniform performance in a wide optimum use range of 12°C to 400°C.

THERMINOL® VP-1

Heat Transfer Fluid by **Solutia**

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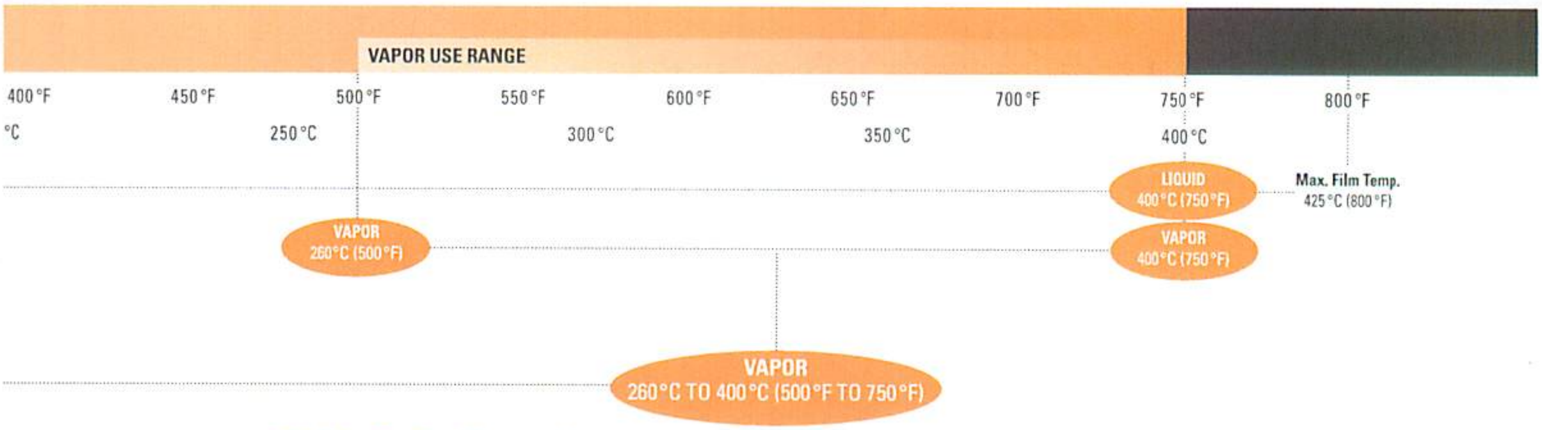

TYPICAL PROPERTIES*†

Appearance	Clear, water-white liquid
Composition	Biphenyl and diphenyl oxide
Moisture Content, Maximum	300 ppm
Chlorine	< 10 ppm
Sulfur	< 10 ppm
Neutralization Number	< 0.2 mg KOH/g
Copper Corrosion (ASTM D-130)	<< 1 a
Flash Point, Open Cup (ASTM D-92)	124 °C (255 °F)
Closed Cup (Pensky-Martens)	110 °C (230 °F)
Fire Point (ASTM D-92)	127 °C (260 °F)
Autoignition Temperature (ASTM D-2155)	621 °C (1150 °F)
Kinematic Viscosity at 40 °C	2.48 mm^2/s (cSt)
at 100 °C	0.99 mm^2/s (cSt)
Density at 25 °C	1060 kg/m^3 (8.85 lb/gal)
Specific Gravity (60 °F/60 °F)	1.069
Coefficient of Thermal Expansion at 200 °C	0.000979/°C (0.000544/°F)
Average Molecular Weight	166
Crystallization Point	12 °C (54 °F)
Volume Contraction Upon Freezing	6.27%
Volume Expansion Upon Melting	6.69%
Surface Tension in Air at 25 °C	36.6 dyn/cm
Heat of Fusion	97.3 kJ/kg (41.8 Btu/lb)
Normal Boiling Point	257 °C (495 °F)
Heat of Vaporization at Maximum Use Temperature 400 °C	206 kJ/kg (88.7 Btu/lb)
Specific Resistivity at 20 °C	6.4×10^{11} ohm-cm
Optimum Use Range, Liquid	12 °C-400 °C (54 °F-750 °F)
Vapor	260 °C-400 °C (500 °F-750 °F)
Maximum Film Temperature	425 °C (800 °F)
Pseudocritical Temperature	499 °C (930 °F)
Pseudocritical Pressure	33.1 bar (480 psia)
Pseudocritical Density	327 kg/m^3 (20.4 lb/ft^3)

* These data are based upon samples tested in the laboratory and are not guaranteed for all samples. Write us for complete sales specifications for Therminol VP-1 fluid.

† Does not constitute an express warranty. See NOTICE on the last page of this bulletin.

LIQUID PROPERTIES OF THERMINOL®

Temperature		Liquid Density			Liquid Heat Capacity		Liquid Enthalpy**	
°F	°C	lb/gal	lb/ft³	kg/m³	Btu/lb-°F [cal/g-°C]	kJ/kg·K	Btu/lb	kJ/kg
54	12	8.93	66.8	1071	0.364	1.52	0.0	0.0
60	16	8.91	66.7	1068	0.366	1.53	2.3	5.4
80	27	8.84	66.1	1059	0.374	1.57	9.8	22.7
100	38	8.76	65.5	1050	0.382	1.60	17.3	40.2
120	49	8.69	65.0	1041	0.390	1.63	25.0	58.2
140	60	8.61	64.4	1032	0.397	1.66	32.9	76.4
160	71	8.53	63.8	1023	0.405	1.69	40.9	95.1
180	82	8.46	63.3	1014	0.412	1.73	49.1	114.1
200	93	8.38	62.7	1004	0.420	1.76	57.4	133.4
220	104	8.31	62.1	995	0.427	1.79	65.9	153.1
240	116	8.23	61.6	986	0.435	1.82	74.5	173.1
260	127	8.15	61.0	977	0.442	1.85	83.3	193.5
280	138	8.07	60.4	967	0.449	1.88	92.2	214.2
300	149	7.99	59.8	958	0.457	1.91	101.2	235.3
320	160	7.91	59.2	948	0.464	1.94	110.4	256.7
340	171	7.83	58.6	939	0.471	1.97	119.8	278.4
360	182	7.75	58.0	929	0.478	2.00	129.3	300.5
380	193	7.67	57.4	919	0.485	2.03	138.9	322.9
400	204	7.59	56.8	909	0.492	2.06	148.7	345.6
420	216	7.50	56.1	899	0.499	2.09	158.6	368.6
440	227	7.42	55.5	889	0.506	2.12	168.7	392.0
460	238	7.33	54.9	879	0.514	2.15	178.9	415.7
480	249	7.25	54.2	868	0.521	2.18	189.2	439.8
495	257	7.18	53.7	860	0.526	2.20	197.0	457.4
500	260	7.16	53.5	857	0.528	2.21	199.7	464.1
520	271	7.07	52.8	847	0.535	2.24	210.3	488.8
540	282	6.97	52.2	835	0.542	2.27	221.1	513.8
560	293	6.88	51.4	824	0.549	2.30	232.0	539.2
580	304	6.78	50.7	812	0.556	2.33	243.0	564.9
600	316	6.68	50.0	800	0.563	2.36	254.2	590.9
620	327	6.58	49.2	788	0.570	2.39	265.5	617.2
640	338	6.47	48.4	775	0.578	2.42	277.0	643.9
660	349	6.36	47.6	762	0.586	2.45	288.7	671.0
680	360	6.25	46.7	749	0.594	2.48	300.5	698.4
700	371	6.13	45.9	734	0.602	2.52	312.4	726.2
720	382	6.01	44.9	720	0.612	2.56	324.6	754.4
740	393	5.88	43.9	704	0.622	2.60	336.9	783.1
750	399	5.81	43.4	696	0.627	2.62	343.1	797.6
760	404	5.74	42.9	687	0.633	2.65	349.4	812.2
780	416	5.59	41.8	670	0.646	2.70	362.2	842.0
800	427	5.43	40.6	651	0.662	2.77	375.3	872.4

* These data are based upon samples tested in the laboratory and are not guaranteed for all samples. Write us for complete sales specifications for Therminol VP-1 fluid.

** The enthalpy basis is liquid at the crystallizing point, 53.6 °F (12 °C).

† Does not constitute an express warranty. See NOTICE on the last page of this bulletin.

VP-1 HEAT TRANSFER FLUID

Liquid Thermal Conductivity			Liquid Viscosity			Vapor Pressure				Temperature	
Btu/ ft-hr-°F	kcal/ m-hr-°C	W/m·K	lb/ft-hr	cSt [mm²/s]	cP [mPa·s]	psia	mm Hg	kgf/cm²	kPa	°F	°C
0.0792	0.1179	0.1370	13.26	5.12	5.48					54	12
0.0790	0.1176	0.1367	11.84	4.58	4.89					60	16
0.0784	0.1167	0.1357	8.64	3.37	3.57	0.0004	0.019	0.00003	0.0026	80	27
0.0778	0.1158	0.1346	6.60	2.60	2.73	0.0010	0.054	0.00007	0.0071	100	38
0.0772	0.1148	0.1334	5.23	2.08	2.16	0.0026	0.134	0.00018	0.0178	120	49
0.0765	0.1138	0.1323	4.26	1.707	1.761	0.0059	0.307	0.00042	0.0409	140	60
0.0758	0.1128	0.1310	3.55	1.434	1.467	0.0127	0.655	0.00087	0.0874	160	71
0.0750	0.1117	0.1298	3.01	1.228	1.244	0.0254	1.31	0.00179	0.175	180	82
0.0743	0.1106	0.1285	2.59	1.067	1.071	0.0483	2.50	0.00339	0.333	200	93
0.0735	0.1094	0.1271	2.26	0.938	0.934	0.0872	4.51	0.00613	0.602	220	104
0.0727	0.1082	0.1257	1.990	0.834	0.823	0.151	7.81	0.0106	1.04	240	116
0.0719	0.1070	0.1243	1.769	0.749	0.731	0.251	13.0	0.0177	1.73	260	127
0.0710	0.1057	0.1228	1.585	0.677	0.655	0.404	20.9	0.0284	2.78	280	138
0.0701	0.1044	0.1213	1.430	0.617	0.591	0.629	32.5	0.0442	4.33	300	149
0.0692	0.1030	0.1197	1.298	0.566	0.537	0.951	49.2	0.0669	6.56	320	160
0.0683	0.1017	0.1181	1.185	0.522	0.490	1.40	72.6	0.0986	9.67	340	171
0.0674	0.1002	0.1165	1.086	0.483	0.449	2.02	105	0.142	13.9	360	182
0.0664	0.0988	0.1148	1.001	0.450	0.414	2.85	147	0.200	19.6	380	193
0.0654	0.0973	0.1131	0.926	0.421	0.383	3.94	204	0.277	27.2	400	204
0.0644	0.0958	0.1113	0.859	0.395	0.355	5.35	277	0.376	36.9	420	216
0.0633	0.0942	0.1095	0.800	0.372	0.331	7.15	370	0.503	49.3	440	227
0.0622	0.0926	0.1076	0.748	0.352	0.309	9.41	487	0.661	64.9	460	238
0.0611	0.0910	0.1057	0.700	0.333	0.290	12.2	631	0.858	84.2	480	249
0.0603	0.0897	0.1043	0.668	0.321	0.276	14.7	760	1.03	101	495	257
0.0600	0.0893	0.1038	0.658	0.317	0.272	15.6	808	1.10	108	500	260
0.0588	0.0876	0.1018	0.620	0.303	0.256	19.8	1020	1.39	136	520	271
0.0577	0.0858	0.0998	0.585	0.289	0.242	24.8	1280	1.74	171	540	282
0.0565	0.0841	0.0977	0.553	0.278	0.229	30.7	1590	2.16	211	560	293
0.0552	0.0822	0.0956	0.524	0.267	0.217	37.6	1940	2.64	259	580	304
0.0540	0.0804	0.0934	0.498	0.257	0.206	45.7	2360	3.21	315	600	316
0.0527	0.0785	0.0912	0.474	0.248	0.1958	55.1	2850	3.87	380	620	327
0.0514	0.0765	0.0890	0.451	0.241	0.1866	65.8	3400	4.63	454	640	338
0.0501	0.0746	0.0867	0.431	0.234	0.1781	78.1	4040	5.49	539	660	349
0.0488	0.0726	0.0844	0.412	0.227	0.1703	92.1	4760	6.47	635	680	360
0.0474	0.0705	0.0820	0.394	0.222	0.1630	108	5580	7.58	743	700	371
0.0460	0.0685	0.0796	0.378	0.217	0.1562	125	6490	8.82	865	720	382
0.0446	0.0663	0.0771	0.363	0.213	0.1500	145	7510	10.2	1000	740	393
0.0439	0.0653	0.0759	0.356	0.211	0.1470	156	8060	11.0	1070	750	399
0.0431	0.0642	0.0746	0.349	0.210	0.1441	167	8640	11.7	1150	760	404
0.0417	0.0620	0.0721	0.335	0.207	0.1387	191	9890	13.4	1320	780	416
0.0402	0.0598	0.0695	0.323	0.205	0.1336	218	11300	15.3	1500	800	427

VAPOR PROPERTIES OF THERMINOL®

Temperature		Vapor Density		Vapor Heat Capacity		Heat of Vaporization		Vapor Enthalpy***	
°F	°C	lb/ft³	kg/m³	Btu/lb-°F [cal/g-°C]	kJ/kg·K	Btu/lb	kJ/kg	Btu/lb	kJ/kg
54	12			0.233	0.98	180.3	419.0	180.3	419.0
60	16			0.236	0.99	179.4	417.1	181.8	422.5
80	27	0.00001	0.00017	0.245	1.03	176.8	411.1	186.6	433.7
100	38	0.00003	0.00046	0.254	1.06	174.3	405.1	191.6	445.3
120	49	0.00007	0.00110	0.263	1.10	171.7	399.2	196.8	457.3
140	60	0.00015	0.00245	0.272	1.14	169.2	393.3	202.1	469.8
160	71	0.00032	0.00507	0.280	1.17	166.7	387.5	207.6	482.6
180	82	0.00061	0.00985	0.289	1.21	164.2	381.8	213.3	495.8
200	93	0.00113	0.0181	0.298	1.25	161.8	376.1	219.2	509.5
220	104	0.00199	0.0318	0.306	1.28	159.4	370.4	225.2	523.5
240	116	0.00334	0.0535	0.315	1.32	156.9	364.8	231.4	537.9
260	127	0.00541	0.0866	0.323	1.35	154.5	359.2	237.8	552.7
280	138	0.00846	0.136	0.331	1.39	152.2	353.7	244.3	567.9
300	149	0.0128	0.206	0.340	1.42	149.8	348.2	251.0	583.5
320	160	0.0189	0.303	0.348	1.45	147.4	342.7	257.9	599.4
340	171	0.0273	0.437	0.356	1.49	145.1	337.2	264.8	615.6
360	182	0.0384	0.615	0.363	1.52	142.7	331.7	272.0	632.2
380	193	0.0529	0.848	0.371	1.55	140.4	326.3	279.3	649.1
400	204	0.0717	1.15	0.379	1.58	138.0	320.8	286.7	666.4
420	216	0.0954	1.53	0.386	1.62	135.6	315.3	294.2	683.9
440	227	0.125	2.00	0.394	1.65	133.2	309.7	301.9	701.7
460	238	0.162	2.59	0.401	1.68	130.8	304.1	309.7	719.9
480	249	0.206	3.31	0.408	1.71	128.4	298.5	317.6	738.2
495	257	0.246	3.93	0.414	1.73	126.6	294.2	323.6	752.1
500	260	0.260	4.17	0.416	1.74	125.9	292.7	325.6	756.9
520	271	0.325	5.20	0.423	1.77	123.4	286.9	333.7	775.7
540	282	0.401	6.43	0.430	1.80	120.9	281.0	342.0	794.8
560	293	0.492	7.87	0.437	1.83	118.3	274.9	350.2	814.1
580	304	0.597	9.57	0.444	1.86	115.6	268.7	358.6	833.6
600	316	0.720	11.5	0.451	1.89	112.9	262.3	367.1	853.2
620	327	0.862	13.8	0.458	1.91	110.0	255.8	375.6	873.0
640	338	1.03	16.4	0.464	1.94	107.1	249.0	384.2	893.0
660	349	1.22	19.5	0.471	1.97	104.1	242.0	392.8	913.0
680	360	1.43	22.9	0.478	2.00	101.0	234.7	401.4	933.1
700	371	1.68	26.9	0.485	2.03	97.7	227.1	410.1	953.3
720	382	1.96	31.4	0.492	2.06	94.2	219.1	418.8	973.5
740	393	2.29	36.6	0.500	2.09	90.6	210.6	427.5	993.7
750	399	2.47	39.5	0.504	2.11	88.7	206.2	431.9	1003.8
760	404	2.66	42.6	0.508	2.12	86.8	201.7	436.2	1013.9
780	416	3.08	49.4	0.516	2.16	82.6	192.1	444.9	1034.0
800	427	3.57	57.2	0.526	2.20	78.1	181.6	453.4	1054.0

* Vapor properties given are for saturated vapor.
** These data are based upon samples tested in the laboratory and are not guaranteed for all samples. Write us for complete sales specifications for Therminol VP-1 fluid.
*** The enthalpy basis is liquid at the crystallizing point, 53.6 °F (12 °C).
† Does not constitute an express warranty. See NOTICE on the last page of this bulletin.

Vapor Thermal Conductivity			Vapor Viscosity			Temperature	
Btu/ ft-hr-°F	kcal/ m-hr-°C	W/m·K	lb/ft-hr	cSt [mm²/s]	cP [mPa·s]	°F	°C
0.0047	0.0069	0.0081	0.0138		0.0057	54	12
0.0048	0.0071	0.0082	0.0140		0.0058	60	16
0.0051	0.0076	0.0088	0.0145		0.0060	80	27
0.0054	0.0081	0.0094	0.0150		0.0062	100	38
0.0057	0.0086	0.0099	0.0156		0.0064	120	49
0.0061	0.0090	0.0105	0.0161	2720	0.0067	140	60
0.0064	0.0095	0.0111	0.0167	1360	0.0069	160	71
0.0068	0.0100	0.0117	0.0172	723	0.0071	180	82
0.0071	0.0106	0.0123	0.0178	405	0.0074	200	93
0.0074	0.0111	0.0129	0.0183	238	0.0076	220	104
0.0078	0.0116	0.0135	0.0189	146	0.0078	240	116
0.0082	0.0121	0.0141	0.0194	92.8	0.0080	260	127
0.0085	0.0127	0.0147	0.0200	61.0	0.0083	280	138
0.0089	0.0132	0.0154	0.0206	41.3	0.0085	300	149
0.0092	0.0138	0.0160	0.0211	28.8	0.0087	320	160
0.0096	0.0143	0.0166	0.0217	20.5	0.0090	340	171
0.0100	0.0149	0.0173	0.0222	15.0	0.0092	360	182
0.0104	0.0154	0.0179	0.0228	11.1	0.0094	380	193
0.0107	0.0160	0.0186	0.0234	8.41	0.0097	400	204
0.0111	0.0166	0.0192	0.0239	6.47	0.0099	420	216
0.0115	0.0171	0.0199	0.0245	5.05	0.0101	440	227
0.0119	0.0177	0.0206	0.0250	3.99	0.0103	460	238
0.0123	0.0183	0.0213	0.0256	3.20	0.0106	480	249
0.0126	0.0187	0.0218	0.0260	2.73	0.0107	495	257
0.0127	0.0189	0.0220	0.0261	2.59	0.0108	500	260
0.0131	0.0195	0.0226	0.0267	2.12	0.0110	520	271
0.0135	0.0201	0.0233	0.0272	1.75	0.0113	540	282
0.0139	0.0207	0.0240	0.0278	1.46	0.0115	560	293
0.0143	0.0213	0.0248	0.0284	1.22	0.0117	580	304
0.0147	0.0219	0.0255	0.0289	1.04	0.0120	600	316
0.0152	0.0225	0.0262	0.0294	0.882	0.0122	620	327
0.0156	0.0232	0.0269	0.0300	0.754	0.0124	640	338
0.0160	0.0238	0.0277	0.0306	0.649	0.0126	660	349
0.0164	0.0244	0.0284	0.0311	0.560	0.0128	680	360
0.0169	0.0251	0.0292	0.0316	0.486	0.0131	700	371
0.0173	0.0257	0.0299	0.0322	0.423	0.0133	720	382
0.0177	0.0264	0.0307	0.0327	0.369	0.0135	740	393
0.0180	0.0267	0.0310	0.0330	0.345	0.0136	750	399
0.0182	0.0270	0.0314	0.0332	0.323	0.0137	760	404
0.0186	0.0277	0.0322	0.0338	0.283	0.0140	780	416
0.0191	0.0284	0.0330	0.0343	0.248	0.0142	800	427

PHYSICAL AND CHEMICAL CHARACTERISTICS

Therminol® VP-1 is a eutectic mixture of 73.5% diphenyl oxide and 26.5% biphenyl. It is usable as a liquid or as a boiling-condensing heat transfer medium up to 750 °F (400 °C). It is miscible and interchangeable (for top-up or design purposes) with other similarly constituted diphenyl-oxide/biphenyl fluids.

Fluid Parameters Which Influence Design

The physical characteristics of Therminol VP-1 heat transfer fluid should be considered in the general arrangement of any heat transfer system in which it is to be used.

Therminol VP-1 has a low viscosity between its melting point (54 °F, 12 °C) and the temperature at which it vaporizes. In geographic areas where the system may be exposed to temperatures below this level, all piping that may contain the fluid in its liquid state should be heat traced.

Therminol VP-1 is exceptionally heat stable. However, care must be taken to avoid overheating, which could lead to deposition of solids on the heating surfaces of the vaporizer. Circulation rates in the heater should be selected to limit skin temperatures to reasonable values, with due consideration to the cost of replacing damaged fluid and the cost of maintaining an adequate heat flux. This is normally accomplished by the vaporizer or heater manufacturer in the course of recommending a particular unit and stipulating its operating parameters.

Under normal operating conditions, a vapor phase fluid will accumulate low-boiling contaminants such as air, water and degradation products. These noncondensables must be vented from the system to avoid aberrations in temperature control. Each user, or group of users if arranged in series, that operates after the same control valve should have at least one vapor accumulator (VA) installed for detecting and venting noncondensables. This is especially true if close temperature control is needed.

The physical and thermodynamic properties of Therminol VP-1 can be found on pages 2-5.

FIRE SAFETY CONSIDERATIONS

Leaks from pipes, valves or joints that saturate insulation are potentially hazardous because of the wicking effect and large surface exposure. Under such conditions, along with high temperatures, many organic liquids can spontaneously ignite. Leaks should be promptly repaired and the contaminated insulation replaced.

Leaks from a direct-fired vaporizer into the fire chamber normally result in burning of the vapor. Obviously, this should be avoided.

When vapor leaks from a pressurized system to the atmosphere, it is condensed by the relatively cold air which it contacts. This causes formation of a fog of tiny liquid droplets. Fogs of combustible liquids, of sufficiently high concentration in air, will burn if ignited. The fogs are flammable even though the overall temperature of the fog-air mixture may be below the flash point of the liquid and even though the vapor saturation concentration is below the flammable level.

The combustion of a fog-air mixture can result in an explosion, much like the combustion of a flammable vapor-air mixture. Such a fog-air mixture, however, does not normally ignite spontaneously. An ignition source is necessary, together with a sufficient concentration of the combustible fog.

Good safety practice in design, maintenance and operation can circumvent the potential dangers associated with pressurized organic vapor systems. In addition, further safeguards can be provided through the installation of special safety systems.

For further information on such safety devices for vapor phase systems, refer to the Solutia Central Engineering Study on this topic, available in reprint from from the American Institute of Chemical Engineers* (CEP Technical Manual, Volume 10, "Loss Prevention").

*1 G. C. Vincent and W. B. Howard, Hydrocarbon Mist Explosions, Part I – Prevention by Explosion Suppression.

*2 G. C. Vincent and R. C. Nelson, W. B. Howard and W. W. Russell, Hydrocarbon Mist Explosions, Part II – Prevention by Water Fog.

START-UP AND SHUT-DOWN PROCEDURES

Vapor System Start-up

There are several ways to start up vapor phase heating systems, but they generally contain these basic steps:

1. Open the vacuum system connection to the vapor system and wait until a steady-state vacuum is reached.
2. Close all valves to isolate the vapor system from the vacuum system.
3. Wait approximately 15 minutes and note any significant increase in pressure in the system. (This step is necessary to ensure that the system is fully closed.)
4. Introduce Therminol VP-1 to the vaporizer (or reboiler) and gradually heat to operating temperature. Periodically open the vacuum connections on the vent accumulators to evacuate the noncondensables. Continue venting until the temperature indicators show that hot vapor has reached the vent accumulators.

System Shut-down, Vacuum Draining

When the system is to be drained to a vacuum vessel, the shut-down procedure is as follows:

1. Cut off the heat source from the system.
2. Open the drain line to the vacuum vessel. (The liquid in the system will continue to flash into the drain until the vapor pressure of the liquid reaches the vacuum being pulled.)
3. When the liquid level stops dropping, introduce nitrogen to break the vacuum. The remaining liquid will drain relatively quickly.

System Shut-down, Pressure Draining

For draining into a pressure vessel, the procedure is only slightly different:

1. Make sure the available nitrogen pressure is less than the relief pressure of the vapor system.
2. Cut off the heat source.
3. Introduce nitrogen to the system.
4. Open the drain line to the pressure vessel.
5. Close the drain line after the system is drained.
6. Open all high-point vacuum connections to purge and help cool the system.

TOXICITY AND HANDLING

Toxicity

The rat acute oral LD50 of Therminol VP-1 heat transfer fluid is 2.05 grams/kilogram, administered as the undiluted material. When held in continuous 24-hour contact with rabbit skin, the dermal LD50 was estimated to be greater than 5.01 grams/kilogram. Thus, Therminol VP-1 is considered to be slightly toxic by ingestion in single doses and practically non-toxic by single dermal applications.

When 0.1 milliliter of undiluted Therminol VP-1 was placed into the conjunctival sac of the rabbit's eye, a slight degree of irritation resulted. The average score of the 24-, 48- and 72-hour readings was 3.8 on a scale of 110.0. All eyes had regained a normal appearance 72 hours after they were dosed.

A mild degree of irritation resulted when 0.5 milliliter of Therminol VP-1 was held in continuous 24-hour contact with intact and abraded rabbit skin. The Primary Irritation Index was 2.9 on a scale of 8.0.

Rats were exposed to a stream of air which was passed through Therminol VP-1 and led directly into the experimental chamber. Due to its low volatility, there was essentially no vaporization of test material, and the animals survived both the six-hour exposure and the subsequent 14-day observation period without observable effects.

THERMINOL® VP-1

Heat Transfer Fluid by **Solutia**

SAFETY AND HANDLING: Material Safety Data Sheets may be obtained from Environmental Operations, Industrial Products Group, Solutia Inc. Heat transfer fluids are intended only for indirect heating purposes. Under no circumstances should this product contact or in any way contaminate food, animal feed, food products, food packaging materials, food chemicals, pharmaceuticals or any items which may directly or indirectly be ultimately ingested by humans. Any contact may contaminate these items to the extent that their destruction may be required. Precautions against ignitions and fires should be taken with this product.

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Parc Scientifique - Fleming
B-1348 Louvain-la-Neuve (Sud)
Belgium
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Fax: 32.10.48.12.12

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Fax: 55-11-5087-3030

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Fax: 905-826-3119

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Solutia Chemical Co. Ltd., Suzhou
9th Floor, Kings Tower
16 Shi Shan Road
Suzhou New District, PRC 215011
Tel: 86-512-825-3191
Fax: 86-512-825-0417

Colombia
Solutia Colombia Ltda.
Carrera 7 No. 71-21
Torre B, ofc.: 906
Santa Fe de Bogota, DC
Colombia
Tel: 571-317-48-20
Fax: 571-317-48-20

India
Solutia Chemicals India Private Limited
205-207, 'Midas'
Sahar Plaza Complex
Andheri-Kurla Road
Andheri (E)
Mumbai 400 059 India
Tel : 91 22 8302862/64
Fax: 91 22 8310059

Japan
Solutia Japan Ltd.
Shinkawa Sanko Building
Second Floor
1-13-17, Shinkawa, Chuo-ku
Tokyo 104-0033, Japan
Tel: (03) 3523 2080
Fax: (03) 3523 2070

Korea
Solutia Korea Ltd.
3rd Floor, Anglican Church Building
3-7, Jeong-dong, Joong-gu,
Seoul 100-120, Korea
Tel: 82-2-736-7112
Fax: 82-2-739-5049

Malaysia
Solutia Hong Kong Ltd.
Malaysia Branch
12th Floor (1309-B)
Kelana Parkview Tower
No. 1 Jalan SS 6/2
Kelana Jaya
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Fax: 60-3-704-4067

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Blvd. Manuel Avila Camacho No. 40, Piso 12
Colonia Lomas de Chapultepec
11000 Mexico, D.F.
Tel: 525-202-5600
Fax: 525-202-0979

Singapore
Solutia Singapore Pte. Ltd.
101 Thomson Road
#19-01/02 United Square
Singapore 307591
Tel: 65-355-7239
Fax: 65-254-3138

Taiwan
Solutia Taiwan Inc.
2F, 124 Chung Cheng Road
Shin Lin District, Taipei
Taiwan, R.O.C.
Tel: 886-2-2835-1666
Fax: 886-2-8866-2703

Thailand
Solutia Thailand Ltd.
19th Floor, SCB Park Plaza
19 Ratchadapisek Road
Laadyao, Chatuchak
Bangkok, Thailand 10900
Tel: 66-2-937-8860
Fax: 66-2-937-8865

Venezuela
Solutia Venezuela SRL
Avenida Francisco de Miranda
Edificio Parque Cristal
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EXHIBIT D

Richard Wales

From:	Will Walters [WWalters@aspeneg.com]
Sent:	Monday, January 25, 2010 3:28 PM
To:	Roseana Navarro-Brasington; Chris Anderson; Sam Oktay; Richard Wales; Glen Stephens; kcoats@aqmd.gov; Stanley Tom
Cc:	Alan De Salvio; Gerry Bemis
Subject:	Solar Thermal Projects - Methodology Consensus - HTF emissions comparison for the Five Fast Track Solar Projects and Beacon

Attachments: THERMINOL_VP1.pdf; 6 Solar HTF Emission Comparison 1-25-10.xlsx

Solar Project Permitting Engineers,

It has come to the attention of CEC air quality staff that the emissions estimating methods and emissions control for solar thermal plants using organic heat transfer fluids (HTF) are currently inconsistently applied between projects, which results in very different VOC and air toxics emissions estimates. The CEC is interested in pursuing a consensus on the proper HTF emission estimation methodology with all of the local Air Districts that are now permitting projects that use the HTF VP-1. Those projects, by local Air District, are as follows:

KCAPCD – Beacon Solar Energy Project, Ridgecrest Solar Power Project
MDAQMD – Abengoa Mojave Solar Power Project, Genesis Solar Energy Project, Blythe Solar Power Project, Palmdale Hybrid Power Plant Project
SCAQMD – Palen Solar Power Project
SJVAPCD – San Joaquin Solar 1 & 2

* The attached spreadsheet provides a comparison in Heat Transfer Fluid (HTF) VOC and air toxics assumptions and VOC emissions estimates for six of the eight current solar projects that use HTF. As can be seen there are some very different assumptions in terms of liquid service type for components, hours/day considered for emissions, HTF venting, and HTF waste load out. Also, very different assumptions regarding Toxics composition of the venting emissions and the piping component emissions. This results in an almost an order of magnitude difference in the lbs/year/MW calculated for the three Solar Millennium projects (Blythe, Palen, Ridgecrest) versus the three other projects, without a reasonable rationale for that difference. Also provided is a specification sheet for Therminol VP-1 that among other things provides vapor pressure data as a function of temperature. It is desired that we try to determine a reasonable and consistent emission estimate approach to apply to all of these projects and future solar thermal projects that use organic HTF. Initial suggestions and notes with a few gaps, we are interested in all thoughts and comments to develop a consensus on approach, are provided below:

Suggested Piping Component Emission Assumptions/Notes

1) Assume that the pumps, valves, flanges/connectors, drains, etc. are in light liquid service when the HTF is hot – Assume 24 hours per day since HTF remains in the pipes 24/7 and is reasonably warm most of the time under most circumstances.
2) Alternatively assume that the pumps, valves, flanges/connectors, drains, etc. are in heavy liquid service when the HTF is cooler – Assume 16 hours light liquid hot service and 8 hours/day for heavy liquid cooler HTF service.
3) Finally, another method would be to determine if VP-1 meets light liquid definitions for various regulations...but my reading of 40CFR60.485e and .633(h)(2) don't seem to show a very clear definition for heated liquids, where by their definition VP-1 likely would be a heavy liquid.

4) Emission factor basis – develop consensus with regulatory agencies, which could be the SOCMI factors used by KCAPCD Glen Stephens as shown for Beacon.
5) Assume leakage composition for in liquid service is same as HTF composition (essentially no breakdown in the pipes), or alternatively conservatively assume some small percentage of toxics.
6) Assume PRVs are in gas service.
7) Assume toxics from piping component in gas service using composition provided in Abengoa Mojave vent assumptions that are identified to be from the HTF supplier...which are 40.6% Benzene, 0.44% Phenol, 2.86% Toluene, and 26.5% Biphenyl (please note that we are in the process of contacting the HTF manufacturer to confirm these and other assumptions).
8) Assume piping component leak detection/inspection programs will be required.
9) Specific equipment assumptions that impact emission factors (double seal pumps, etc.) require additional review and consensus.

Other Assumptions/Ongoing Issues

1) BACT for venting...if BACT is triggered, which seems reasonable based on the potential emissions if totally uncontrolled, would carbon adsorption with at least 98% control efficiency for emissions of the HTF decomposition products (sometimes called "low boilers") or other technologies with at least 98% control of the HTF decomposition products be a reasonable BACT emission control efficiency floor, or would a lower value of 95% or a higher value of 99% be reasonable for BACT for the low boilers VOC control?
2) Specific venting assumptions, hours/day and hours/year, and technical rationale for venting volumes (which are critical to the emission calculations) still need to be determined.
3) Assume toxics from venting using composition provided in Abengoa Mojave vent assumptions that are identified to be from the HTF supplier, which as noted above are 40.6% Benzene, 0.44% Phenol, 2.86% Toluene, and 26.5% Biphenyl.
4) Waste load emissions are minimal (<0.1 tons/year) and therefore may not require a detailed consistent approach, but I would be interested in thoughts on this emission source as well.

We would like to resolve this issue before rather than after the five fast track solar (Mojave, Ridgecrest, Genesis, Blythe, Palen) PDOCs are completed if that is possible, but realize that may not be possible; and to revise other DOCs and CEC staff assessments as appropriate prior to the commission decisions for projects that have already received PDOC or FDOC documents.

We could set up a conference call to discuss this issue with any or all of the parties, if that is desired.

Also, please feel free to forward this message to your engineering managers if we have not already done so.

At this time, due to time limitations and information limitations, we have not worked up similar emission assumptions data for the Palmdale Solar Hybrid and San Joaquin 1&2 Solar projects that also propose to use VP-1 HTF, but we believe that there are consistency of emissions estimation approach or other HTF permitting issues related to these two projects.

Thank you,

Will Walters, Aspen Environmental Group
818-597-3407 ext. 345

Project	Source	Equipment	Component Count	Emission Factor (lb/hr/source)	Emissions (lb/hr)	Hr/day In Service	Service	assumed toxics split per source	Emission Control Assumptions	Emission Factor Source
Blythe	HTF Vent				0.75		Gas	99.99% Benzene, 0.01% Biphenyl	Carbon Adsorption - 98%	Applicant Estimated
	Piping Components	Valves	3050	1.85E-05	5.65E-02	24	Heavy Oil	No Toxics, just HTF VOC	None	EPA 1995 protocol
		Pump Seals	4	5.29E-05	2.12E-04	24	Heavy Oil	No Toxics, just HTF VOC	None	EPA 1995 protocol
		Connectors	7594	1.65E-05	1.26E-01	24	Heavy Oil	No Toxics, just HTF VOC	None	EPA 1995 protocol
		Pressure Relief Valves	10	1.85E-05	1.85E-04	24	Heavy Oil	No Toxics, just HTF VOC	None	EPA 1995 protocol
Genesis	HTF Vent				0.1685		Gas	89.9% Benzene 9.8% Phenol	Carbon Adsorption - 99%	Applicant Estimate
	Piping Components	Valves	2500	2.52E-04	6.29E-01	16	Light Liquid	5% Benzene, 5% Phenol	I&M Program	SOCMI per G. Stephens
		Pump Seals	10	8.45E-04	8.45E-03	16	Light Liquid	5% Benzene, 5% Phenol	Double Mechanical Seals and I&M Program	SOCMI per G. Stephens
		Connectors	3000	1.65E-05	4.95E-02	16	All Service	5% Benzene, 5% Phenol	I&M Program	SOCMI per G. Stephens
		Pressure Relief Valves	10	9.85E-02	9.85E-01	8	Gas	5% Benzene, 5% Phenol	I&M Program	SOCMI per G. Stephens
Palen	HTF Vent				0.75		Gas	99.99% Benzene, 0.01% Biphenyl	Carbon Adsorption - 98%	Applicant Estimate
	Piping Components	Valves	3050	1.85E-05	5.65E-02	24	Heavy Oil	No Toxics, just HTF VOC	None	EPA 1995 protocol
		Pump Seals	4	5.29E-05	2.12E-04	24	Heavy Oil	No Toxics, just HTF VOC	None	EPA 1995 protocol
		Connectors	7594	1.65E-05	1.26E-01	24	Heavy Oil	No Toxics, just HTF VOC	None	EPA 1995 protocol
		Pressure Relief Valves	10	1.85E-05	1.85E-04	24	Heavy Oil	No Toxics, just HTF VOC	None	EPA 1995 protocol
Mojave	HTF Vent				1.14		Gas	40.6% Benzene, 2.86% Toluene, 0.44% Phenol, 26.5% Biphenyl	Nitrogen Blanket and water-cooled Distillation - 95.8% for "low boilers"	Applicant Estimate
	Piping Components	Valves	1623.5	2.52E-04	4.09E-01	16	Light Liquid	5% Benzene, 5% Phenol, 26.5% Biphenyl	I&M Program	SOCMI per G. Stephens
		Pump Seals	12	8.45E-04	1.01E-02	16	Light Liquid	5% Benzene, 5% Phenol, 26.5% Biphenyl	Double Mechanical Seals and I&M Program	SOCMI per G. Stephens
		Flanges/Connectors	775	1.65E-05	1.28E-02	16	All Service	5% Benzene, 5% Phenol, 26.5% Biphenyl	I&M Program	SOCMI per G. Stephens
		Pressure Relief Valves	8	9.85E-02	7.88E-01	8	Gas	5% Benzene, 5% Phenol, 26.5% Biphenyl	I&M Program	SOCMI per G. Stephens
Ridgecrest	HTF Vent				0.75		Gas	99.99% Benzene, 0.01% Biphenyl	Carbon Adsorption - 98%	Applicant Estimate
	Piping Components	Valves	3050	1.85E-05	5.65E-02	24	Heavy Oil	No Toxics, just HTF VOC	None	EPA 1995 protocol
		Pump Seals	4	5.29E-05	2.12E-04	24	Heavy Oil	No Toxics, just HTF VOC	None	EPA 1995 protocol
		Connectors	7594	1.65E-05	1.26E-01	24	Heavy Oil	No Toxics, just HTF VOC	None	EPA 1995 protocol
		Pressure Relief Valves	10	1.85E-05	1.85E-04	24	Heavy Oil	No Toxics, just HTF VOC	None	EPA 1995 protocol
Beacon	HTF Vent				0.63		Gas	99.99 % Benzene	Carbon Adsorption - 99%	Applicant Estimated
	Piping Components	Valves	3050	2.52E-04	7.68E-01	16	Light Liquid	No Toxics, just HTF VOC	I&M Program	SOCMI per G. Stephens
		Pump Seals	4	8.45E-04	3.38E-03	16	Light Liquid	No Toxics, just HTF VOC	I&M Program	SOCMI per G. Stephens
		Connectors	7550	1.65E-05	1.25E-01	16	Light Liquid	No Toxics, just HTF VOC	I&M Program	SOCMI per G. Stephens
		Open-End Lines	44	3.31E-03	1.46E-01	16	Light Liquid	No Toxics, just HTF VOC	I&M Program	SOCMI per G. Stephens
		Pressure Relief Valves	6	9.85E-02	5.91E-01	8	Gas	No Toxics, just HTF VOC	I&M Program	SOCMI per G. Stephens

Component counts and emissions are per power block where the power blocks are 250 MW each for Blythe, Palen, Ridgecrest, and Beacon; and 125 MW each for Mojave and Genesis.
Blythe has 4 power blocks, Palen, Mojave, and Genesis have 2 power blocks, and the others have one power block each.

EPA 1995 Protocol = Protocol for Equipment Leak Emission Estimates EPA-453/R-95-017, November 1995
SOCMI = Sythetic Organic Chemical Manufacturers Industry

HTF VOC emissions for Six solar projects

	Mojave			Blythe			Palen			Ridgecrest			Genesis			Beacon		
	Lbs/hr	Lbs/day	TPY	Lbs/hr	Lbs/day	TPY	Lbs/hr	Lbs/day	TPY	Lbs/hr	Lbs/day	TPY	Lbs/hr	Lbs/day	TPY	Lbs/hr	Lbs/day	TPY
HTF Venting	0.57	4.55	0.83	0.75	1.5	0.15	0.75	1.5	0.15	0.75	1.5	0.15	0.17	1.48	0.27	0.63	1.25	0.23
HTF Piping Fugitives	1.22	13.21	2.41	0.182	4.38	0.80	0.182	4.38	0.80	0.182	4.38	0.80	1.675	18.88	3.445	3.231	34.34	6.268
Waste Load Out	6.5E-04	6.5E-04	3.8E-06	0	0	0	0	0	0	0	0	0	0.00065	0.00065	3.8E-06	7.07	14.15	0.08
Total VOC per Block	1.79	17.76	3.24	0.93	5.88	0.95	0.93	5.88	0.95	0.93	5.88	0.95	1.85	20.36	3.72	10.931	49.74	6.578
Total Site VOC	3.58	35.52	6.48	3.73	23.52	3.80	1.86	11.76	1.90	0.93	5.88	0.95	3.69	40.72	7.43	10.93	49.74	6.58
lb/yr/MW			51.8			7.6			7.6			7.6			59.4			52.6

EXHIBIT E

KERN COUNTY AIR POLLUTION CONTROL DISTRICT

PRELIMINARY DETERMINATION OF COMPLIANCE

2700 "M" Street, Suite 302
Bakersfield, CA 93301-2370
Phone: (661) 862-5250
Fax: (661) 862-5251

Field Office
Phone: (661) 823-9264

ISSUE DATE:	**MONTH XX, 2010**	APPLICATION NO.:	**0368003**
EXPIRATION:	**MONTH XX, 2012**	DATE:	**SEPTEMBER 17, 2009**

DETERMINATION OF COMPLIANCE IS HEREBY GRANTED TO:

SOLAR MILLENNIUM, LLC

DETERMINATION OF COMPLIANCE IS HEREBY GRANTED FOR:

Two 18,000-Gallon Heat Transfer Fluid (HTF) Expansion Tanks Vented To Vapor Control System, Including HTF Piping Network

(See attached sheets for equipment description and conditions)

S	T	R	Location:	Startup Inspection
SW26	27S	39E	APN: 341-110-02, 341-091-08, 341-091-10, 341-91-11, 341-110-01, 341-110-03, 341-110-05, 341-110-06, and 097-070-02	

This document serves as a temporary Permit to Operate only as provided by Rule 201 of the District's Rules and Regulations. For issuance of a Permit to Operate, Rule 208 requires equipment authorized by this Determination of Compliance be installed and operated in accordance with conditions of approval. Changes to these conditions must be made by application and must be approved before such changes are made. This document does not authorize emission of air contaminants in excess of New Source Review limits (Rule 210.1) or Regulation IV emission limits. Emission testing requirements set forth on this document must be satisfied before a Permit to Operate can be granted.

UPON COMPLETION OF CONSTRUCTION AND/OR INSTALLATION, PLEASE TELEPHONE DISTRICT

Validation Signature:

David L. Jones
Air Pollution Control Officer

g:\ATCLTR (2/2006)

CONDITIONS OF APPROVAL:

Pursuant to Rule 209, "conditional approval" is hereby granted. Please be aware compliance with all conditions of approval imposed by any applicable Determination of Compliance remain in effect for life of project, unless modified by application.

EQUIPMENT DESCRIPTION: Two 18,000-Gallon Heat Transfer Fluid (HTF) Expansion Tanks Vented To Vapor Control System, Including HTF Piping Network, including following equipment and design specifications:

A. Two 18,000 Gallon HTF Expansion Tanks No. 1 and 2 each with PV vent valve,
B 4 - 1,250-gal HTF Overflow tanks north solar field,
C 4 - 1,250-gal HTF Overflow tanks south solar field,
D. 25-hp Expansion tank pump,
E. HTF Fluid pumps (400-hp),
F. Nitrogen blanket system,
G. HTF piping header,
H. HTF ullage system,
I. Solar field piping,
J. Solar generating system piping, and
K. Piping from expansion tank to vapor control system.

DESIGN CONDITIONS:

a. Each HTF tank shall be connected to volatile organic compound (VOC) vapor control system (Permit No. 0368004). (Rule 210.1)
b. Volume of each expansion tank shall not exceed 18,000-gallons without prior District approval. (Rule 210.1)

OPERATIONAL CONDITIONS:

1. HTF expansion vessel shall be gas tight and vent to vapor control system (Permit No. 0368004). (Rule 210.1 BACT Requirement)
2. Permittee shall establish an inspection and maintenance program to determine, repair, and log leaks in HTF piping network and expansion tanks. Inspection and maintenance program and related logs shall be available to District staff upon request. (Rule 210.1 BACT Requirement)
   a. All pumps, compressors and pressure relief devices (pressure relief valves 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 a leak detection device such as a Foxboro OVA 108 calibrated for methane.
   c. VOC leaks greater than 100-ppmv shall be repaired within seven calendar days of detection.
   d. VOC leaks greater than 10,000-ppmv shall be repaired within 24-hours of detection.

e. Permittee shall maintain a log of all VOC leaks exceeding 10,000-ppmv, including location, component type, and repair made.
f. Permittee shall maintain record of the amount of HTF replaced on a monthly basis for a period of 5 years.
g. Any leak detected by District inspection(s) 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. Pressure sensing equipment shall be installed that will be capable of sensing a major rupture or spill within the HTF network.

3. The following component count shall be utilized to determine fugitive emissions:

Equipment	Count	Service	hrs/day	Service	hrs/day
Valves	3050	Light Liquid	16	Heavy Liquid	8
Pump Seals	4	Light Liquid	16	Heavy Liquid	8
Connectors*	7594	Light Liquid	16	Heavy Liquid	8
Pressure Relief Valve	10	Gas	16	Heavy Liquid	8

4. Each expansion tank shall have fixed roof without holes, tears, or other such openings, except pressure/vacuum (PV) valves, in the cover which allow the emission of VOC. (Rule 210.1)
5. All expansion tank and overflow tank hatch shall be kept closed and gap-free, except during maintenance, inspection, or repair. (Rule 210.1)
6. Tank roof appurtenances shall not exhibit emissions exceeding 10,000-ppmv as methane measured with an instrument calibrated with methane and conducted in accordance with U.S. EPA Method 21. (Rule 411)
7. Each tank shall be maintained leak-free. A "leak" is defined as the dripping of liquid volatile organic compounds at a rate of three or more drops per minute, or vapor volatile organic compounds in excess of 10,000-ppm as equivalent methane as determined by U.S. EPA Test Method 21. (Rule 210.1)
8. Equipment shall be maintained according to manufacturer's specifications to ensure compliance with emissions limitations. (Rules 210.1 and 209)
9. Compliance with all operational conditions shall be verified by appropriate recordkeeping, including records of operational data needed to demonstrate compliance. Such records shall be kept on site in readily available format. (Rule 210.1)
10. No emission resulting from use of this equipment shall cause injury, detriment, nuisance, annoyance to or endanger comfort, repose, health, or safety of any considerable number of persons or public. (Rule 419 and CH&SC Sec 41700)
11. The District shall be notified of any breakdown conditions in accordance with Rule 111 (Equipment Breakdown). (Rule 111)

CONSTRUCTION ACTIVITY:

All construction phase emissions shall be controlled utilizing reasonably available control provisions, e.g. construction site and unsurfaced roadway dust control, conscientious maintenance of mobile and piston engine-powered equipment, etc.

STATE OF CALIFORNIA AIR TOXICS HOT SPOTS REQUIREMENTS:

Facility shall comply with California Health and Safety Code Sections 44300 through 44384. (Rule 208.1)

COMPLIANCE TESTING REQUIREMENTS:

Should inspection reveal conditions indicative of non-compliance, compliance with hourly and concentration emission limits for VOC shall be verified pursuant to Rule 108.1 and KCAPCD Guidelines for Compliance Testing, within 45 days of District request.

EMISSION LIMITS:

Emissions rate of each air contaminant from this unit shall not exceed following limits:

Volatile Organic Compounds (VOC):	46.43	lb/day
(as defined in Rule 210.1)	8.47	ton/yr

VOC Emissions from HTF Expansion Assessed on Permit No. 0368004

(Emissions limits established pursuant to Rule 210.1, unless otherwise noted.)

Compliance with maximum daily emission limits shall be verified by source operator (with appropriate operational data and recordkeeping to document maximum daily emission rate) each day source is operated and such documentation of compliance shall be retained and made readily available to District for period of three years. (Rules 209 and 210.1)

VIII. EMISSION CALCULATIONS:

A Assumptions:

1. Therminol VP-1: 0.26-lb/ft3 -- from properties chart
2. Facility Operations: Boiler: 14-hr/day, Solar Plant: 16-hr/day, 365-days/year
3. 0.2642 gal/l; 2.2046 lb/kg
4. Boiler Rating and Heater Rating: 35.0-MMBtu/hr
5. Generator Set Rating: 2922-Bhp
6. Fire water pump rating: 300-bhp
7. Propane: HHV 91.5-MMBtu/1000-gal, Sulfur content 0.2-gr/100-scf

B. Emission Factors:

1. Propane Fueled Boiler and Propane Fueled Heater

F (@68):	8727	dscf/MMBtu	
	F(@60) = F(@68) x	0.985	
F(@60):	8596.0000	dscf/MMBtu	
%O2:	3.0000	%	
SV:	379.6	ft^3/lb-mole	(specific molecular volume)
MW NOx:	46.0000	lb/lb-mole	
MW CO:	28.0100	lb/lb-mole	
NOx:	9.0000	ppmv	
CO:	50.0000	ppmv	(applicant proposed)

$$\frac{lb}{MMBtu} = \frac{ppm \times MW \times F}{SV \times 10^6} \times \frac{20.9}{20.9 - \%O_2}$$

	Calculated Emission Factor	Emission Factor Used
NOx:	0.0110 lb/MMBtu	0.011 lb/MMBtu
CO:	0.0370 lb/MMBtu	0.037 lb/MMBtu

Emission Factors (AP-42 {Table 1.5-1}, except NOx – {BACT} and CO – {Applicant Proposed})

	PM_{10}	SOx	NOx	VOC	CO
lb/10^3 gal	0.7	0.02	BACT	0.8	Proposed
lb/MMBtu:	0.0077	0.0002	0.0110	0.0087	0.0370

2. Cooling Water System

Drift Eliminator Control:	0.0005%	of cooling water circulation flow rate (guaranteed by cooling tower vendor)
Cooling water TDS:	1600	mg/liter TDS (total dissolved solids)
	0.01335	lb/gal
Cooling Water Flow Rate:	149,000.0	gal/min

3. Estimated Emissions from Component Count:

Daytime Emission Factors:

Equipment Type	Service	Sampling	(lb/hr/source)	Factor Source
Valves	Light Liquid	100 ppmv	**0.000555**	SOCMI*
Pump Seals	Light Liquid	100 ppmv	**0.001862**	SOCMI
Connectors	Light Liquid	Default Zero	**0.0000165**	SOCMI
Pressure Relief Valve	Gas	<10,000 pmv	**0.098546**	SOCMI
Open-ended Lines	Light Liquid	<10,000 pmv	**0.003307**	SOCMI

*Synthetic Organic Chemicals Manufacturing Industry (Source is EPA's Protocol for Equipment Leak Estimates [EPA-453/R-95-017, November 1995], Tables 2.4, 2.5 and 2.9)

Nighttime Emission Factors:

Equipment Type	Service	Sampling	(lb/hr/source)	Factor Source
Valves	Light Liquid	10,000 ppmv	**0.000019**	SOCMI
Pump Seals	Light Liquid	10,000 ppmv	**0.000053**	SOCMI
Connectors	Light Liquid	Default Zero	**0.0000165**	SOCMI
Pressure Relief Valve	Gas	<10,000 pmv	**0.000019**	SOCMI

4. 2000-kW Generator Set Driven with 2922-bhp Diesel Piston Engine

Max. Horsepower	2922	bhp
Max. daily use, hrs	24	hr
Max weeks use, weeks	52	weeks
Max. annual use, hrs	200.0	hrs
Fuel use	136.60	gal/hr
	1048.17	lb/hr
Sulfur content	0.0015	%

	PM-10	SOx	NOx	VOC	CO
gm/hp-hr	0.150	See Below	4.500	0.300	2.600

SOx: $$1048.17\frac{lb(fuel)}{hr}\times\frac{0.0015(S-fuel\cdot content)}{100}\times 453.59\frac{gm}{lb}\times 2\left(\frac{SO_2}{S}\right)=14.26\frac{gm\cdot SOx}{hr}$$

$$14.26\frac{gm\cdot SOx}{hr}\times\frac{1}{2922}\frac{1}{hp}=0.005\frac{gm\cdot SOx}{hp-hr}$$

$$0.005\frac{gm\cdot SOx}{hp-hr}\times\frac{1}{453.59}\frac{lb}{gm}=1.08\times 10^{-5}\frac{lb\cdot SOx}{hp-hr}$$

PM_{10}: $$0.15\frac{gm\cdot PM_{10}}{hp-hr}\times\frac{1}{453.59}\frac{lb}{gm}=3.31\times 10^{-4}\frac{lb\cdot PM_{10}}{hp-hr}$$

NOx: $$4.5\frac{gm\cdot NOx}{hp-hr}\times\frac{1}{453.59}\frac{lb}{gm}=9.92\times 10^{-3}\frac{lb\cdot NOx}{hp-hr}$$

VOC: $$0.3\frac{gm\cdot VOC}{hp-hr}\times\frac{1}{453.59}\frac{lb}{gm}=6.62\times 10^{-4}\frac{lb\cdot VOC}{hp-hr}$$

CO: $$2.6\frac{gm\cdot CO}{hp-hr}\times\frac{1}{453.59}\frac{lb}{gm}=5.73\times 10^{-3}\frac{lb\cdot CO}{hp-hr}$$

	PM-10	SOx	NOx	VOC	CO
lb/hp-hr	3.31E-04	1.08E-05	9.92E-03	6.62E-04	5.73E-03

5. 300-bhp Diesel Piston Engine Driving Firewater Pump

Max. Horsepower	300
Max. daily use, hrs	24
Max weeks use, weeks	52

Max. annual use, hrs	200.0	
Fuel use	14.5	gal/hr
	111.26	lb/hr
Sulfur content	0.0015	%

	PM-10	SOx	NOx	VOC	CO
gm/hp-hr	0.150	See Below	2.800	0.200	2.600

SOx: $$111.26\frac{lb(fuel)}{hr}\times\frac{0.0015(S-fuel\cdot content)}{100}\times 453.59\frac{gm}{lb}\times 2\left(\frac{SO_2}{S}\right)=1.51\frac{gm\cdot SOx}{hr}$$

$$1.51\frac{gm\cdot SOx}{hr}\times\frac{1}{300}\frac{1}{hp}=0.005\frac{gm\cdot SOx}{hp-hr}$$

$$0.005\frac{gm\cdot SOx}{hp-hr}\times\frac{1}{453.59}\frac{lb}{gm}=1.11\times 10^{-5}\frac{lb\cdot SOx}{hp-hr}$$

PM_{10}: $$0.15\frac{gm\cdot PM_{10}}{hp-hr}\times\frac{1}{453.59}\frac{lb}{gm}=3.31\times 10^{-4}\frac{lb\cdot PM_{10}}{hp-hr}$$

NOx: $$2.8\frac{gm\cdot NOx}{hp-hr}\times\frac{1}{453.59}\frac{lb}{gm}=6.17\times 10^{-3}\frac{lb\cdot NOx}{hp-hr}$$

VOC: $$0.2\frac{gm\cdot VOC}{hp-hr}\times\frac{1}{453.59}\frac{lb}{gm}=4.41\times 10^{-4}\frac{lb\cdot VOC}{hp-hr}$$

CO: $$2.6\frac{gm\cdot CO}{hp-hr}\times\frac{1}{453.59}\frac{lb}{gm}=5.73\times 10^{-3}\frac{lb\cdot CO}{hp-hr}$$

	PM-10	SOx	NOx	VOC	CO
lb/hp-hr	3.31E-04	1.11E-05	6.17E-03	4.41E-04	5.73E-03

C. Emissions Calculations:

1. **ATC No. 0368001 (Boiler):**

   Example Emission Calculations for PM_{10} (Identical Calculations for SOx, NOx, VOC and CO, results are summarized below):

	PM_{10}	SOx	NOx	VOC	CO
lb/MMBtu:	0.0077	0.0002	0.0110	0.0087	0.0370

Hourly: $$0.0077\frac{lb}{MMBtu}\times 35.0\frac{MMBtu}{hr}=0.268\frac{lb}{hr}$$

Daily: $$0.268\frac{lb}{hr}\times 15\frac{hr}{day}=4.02\frac{lb}{day}$$

Annual: $$0.268\frac{lb}{hr}\times 5000\frac{hours}{year}\times\frac{1}{2000}\frac{tons}{lb}=0.67\frac{tons}{year}$$

ATC No. 0368001 (Boiler) Emissions Summary:

	PM_{10}	SOx	NOx	VOC	CO
lb/hr:	0.268	0.008	0.385	0.306	1.295
lb/day:	4.02	0.11	5.78	4.59	19.43
tons/yr:	0.67	0.02	0.96	0.77	3.24

2. **ATC No 0368002 (Heater):**
   Example Emission Calculations for PM_{10} (Identical Calculations for SOx, NOx, VOC and CO, results are summarized below):

	PM_{10}	SOx	NOx	VOC	CO
lb/MMBtu:	0.0077	0.0002	0.0110	0.0087	0.0370

Hourly: $0.0077\frac{lb}{MMBtu}\times 35.0\frac{MMBtu}{hr}=0.268\frac{lb}{hr}$

Daily: $0.268\frac{lb}{hr}\times 10\frac{hr}{day}=2.68\frac{lb}{day}$

Annual: $0.268\frac{lb}{hr}\times 500\frac{hours}{year}\times\frac{1}{2000}\frac{tons}{lb}=0.07\frac{tons}{year}$

ATC No. 0368002 (Heater) Emissions Summary:

	PM_{10}	SOx	NOx	VOC	CO
lb/hr:	0.268	0.008	0.385	0.306	1.295
lb/day:	2.68	0.08	3.85	3.06	12.95
tons/yr:	0.07	0.002	0.10	0.08	0.32

3. **ATC No. 0368003 (HTF Expansion Tanks and Fugitive Emissions):**
   As suggested by CEC representative, fugitive VOC emissions are estimated assuming 16-hrs/day of light liquid service and 8-hr/day of heavy liquid service.

Daytime Emission Factors:

Equipment Type	Service	Count	(lb/hr/source)	Use (hrs/day
Valves	Light Liquid	3050	**0.000555**	16
Pump Seals	Light Liquid	4	**0.001862**	16
Connectors	Light Liquid	7594	**0.0000165**	16
Pressure Relief Valve	Gas	10	**0.098546**	16

Nighttime Emission Factors:

Equipment Type	Service	Count	(lb/hr/source)	Use (hrs/day
Valves	Heavy Liquid	3050	**0.000019**	8
Pump Seals	Heavy Liquid	4	**0.000053**	8
Connectors	Heavy Liquid	7594	**0.0000165**	8
Pressure Relief Valve	Heavy Liquid	10	**0.000019**	8

Fugitive Emissions:

a. **Valves:**

Hourly Emissions (day): $3050-valves\times 0.000555\frac{lb}{hr\cdot valve}\times=1.692\frac{lb}{hr}$

(night): $$3050 - valves \times 0.000019 \frac{lb}{hr \cdot valve} \times = 0.056 \frac{lb}{hr}$$

b. Pump Seals:

Hourly Emissions (day): $$4 - seals \times 0.001862 \frac{lb}{hr \cdot pump \cdot seal} \times = 0.007 \frac{lb}{hr}$$

(night): $$4 - seals \times 0.000053 \frac{lb}{hr \cdot pump \cdot seal} \times = 0.0002 \frac{lb}{hr}$$

c. Connectors:

Hourly Emissions (day): $$7594 - connect \times 0.0000165 \frac{lb}{hr \cdot connect} \times = 0.126 \frac{lb}{hr}$$

(night): $$7594 - connect \times 0.0000165 \frac{lb}{hr \cdot connect} \times = 0.126 \frac{lb}{hr}$$

d. Pressure Relief Valves:

Hourly Emissions (day): $$10 - PRvalves \times 0.098546 \frac{lb}{hr \cdot PRvalve} \times = 0.985 \frac{lb}{hr}$$

(night): $$10 - PRvalves \times 0.000019 \frac{lb}{hr \cdot PRvalve} \times = 0.0002 \frac{lb}{hr}$$

f. Emissions Total:

Equipment Type	Service	Day (lb/hr)	Night (lb/hr)
Valves	Light Liquid	1.692	0.056
Pump Seals	Light Liquid	0.007	0.0002
Connectors	Light Liquid	0.126	0.126
Pressure Relief Valve	Gas	0.985	0.0002
Total:		**2.811**	**0.182**

g. Daily Emissions:

Equipment Type	Daytime (hrs/day)	Daytime (lb/day)	Nighttime (hrs/day)	Daytime (lb/day)
Valves	16	27.0774	8	0.4519
Pump Seals	16	0.1192	8	0.0017
Connectors	16	2.0090	8	1.0045
Pressure Relief Valve	16	15.7673	8	0.0015
Subtotal:		44.9729		1.4595
Grand Total				**46.432**

h. Annual Emissions and Emissions Summary:

$$46.432 \frac{lb}{day} \times 365 \frac{day}{year} \times \frac{1}{2000} \frac{ton}{lb} = 8.474 \frac{ton}{year}$$

ATC No. 0368003 (Solar Field and Expansion Tanks Fugitive Emissions) Emissions Summary:

	PM_{10}	SOx	NOx	VOC	CO
lb/hr:				2.81	
lb/day:				46.32	
tons/yr:				8.47	

4. ATC No. 0368004 (Vapor Control System – Carbon Canisters):

Operating Temperatures (deg F)	High	Low	2/3 Maximum
	740	55	511.666667 (use 500)
Vapor Density @ Median:	0.26	lb/ft3 -- from properties chart	
Expansion Tank Volume:	36000	gal	per 2-hours

Maximum Volume: $36000 \cdot gal \times \frac{1}{7.4805}\frac{ft^3}{gal} = 4812.5 \cdot ft^3$

System operates 2-hr/day

Uncontrolled Emissions: $\frac{4812.5 \cdot ft^3}{2 \cdot hours} \times 0.26\frac{lb}{ft^3} = 625.63\frac{lb}{hr}$

Vapor Control System: Dual carbon adsorption in series
95% control efficiency each (Use 99.5% control efficiency)

$$625.63\frac{lb}{hr}\left(1-\frac{99.5}{100}\right) = 3.13\frac{lb}{hr}$$

$$3.13\frac{lb}{hr} \times 2\frac{hr}{day} = 6.26\frac{hr}{day}$$

$$6.26\frac{hr}{day} \times 365\frac{days}{year} \times \frac{1}{2000}\frac{tons}{lb} = 1.14\frac{tons}{year}$$

ATC No. 0368005 (Vapor Control System) Emissions Summary:

	PM_{10}	SOx	NOx	VOC	CO
lb/hr:				3.13	
lb/day:				6.26	
tons/yr:				1.14	

5. ATC No. 0368005 (Cooling Water System):

PM_{10} Drift Emissions:

$$PM_{10}\left(\frac{lb}{hr}\right) = FlowRate\left(\frac{gal}{\min}\right) \times TDS\left(\frac{lb}{gal}\right) \times \frac{DriftControl\%}{100} \times 60\frac{\min}{hr}$$

where:

Cooling Water Flow Rate:	6,100.0	gal/min
TDS:	0.01670	lb/gal
Drift Eliminator Control:	0.0005	%

$$6{,}100\frac{gal}{\min}\times 0.01670\frac{lb}{gal}\times\frac{0.0005}{100}\times 60\frac{\min}{hr}=0.031\frac{lb}{hr}$$

Daily: $0.031\frac{lb}{hr}\times 16\frac{hr}{day}=0.489\frac{lb}{day}$

Annual: $0.489\frac{lb}{hr}\times 5840\frac{hours}{year}\times\frac{1}{2000}\frac{tons}{lb}=0.089\frac{tons}{year}$

ATC No. 0368005 (Cooling Water Tower) Emissions Summary:

	PM_{10}	SOx	NOx	VOC	CO
lb/hr:	0.03				
lb/day:	0.49				
tons/yr:	0.09				

6. **ATC No. 0368006 (Bio-Remediation Operation):**
Assumed 95% of light VOC component emitted into the atmosphere during leak. Heavy hydrocarbon (VOC) in soil transferred to bio-pile/land-farm for treatment. Minimum 95% control efficiency for heavy hydrocarbons expected for land farming operation.

Uncontrolled VOC Emissions (from liquid leaks – 0368003):
From (0368003): 2.81-lb/hr

$$2.811\frac{lb}{hr}\times\left(1-\left(\frac{95}{100}\right)\right)=0.141\frac{lb}{hr}$$

$$46.432\frac{lb}{day}\times\left(1-\left(\frac{95}{100}\right)\right)=2.321\frac{lb}{hr}$$

2.321 lb/day x 365 days/yr x 0.0005 tons/lb = 0.424-tons/year

Controlled VOC Emissions
Land Farming with 95% Control Efficiency

$$0.141\frac{lb}{hr}\times\left(1-\left(\frac{95}{100}\right)\right)=0.007\frac{lb}{hr}$$

0.007 lb/hr x 24 hr/day = 0.169 lb/day
0.007 lb/hr x 8760 hours/yr x 0.0005 tons/lb = 0.031 tons/year

7. **ATC No. 0368007 (2000-kWe Electrical Generator Driven by 2922-bhp Diesel Engine:**
Example Emission Calculations for PM_{10} (Identical Calculations for SOx, NOx, VOC and CO, results are summarized below):

	PM-10	SOx	NOx	VOC	CO
lb/hp-hr	3.31E-04	1.08E-05	9.92E-03	6.62E-04	5.73E-03

PM_{10}: $3.31\times 10^{-4}\frac{lb\cdot PM_{10}}{hp-hr}\times 2922\cdot hp=0.966\frac{lb}{hr}$

$$0.966\frac{lb}{hr}\times 24\frac{hr}{day} = 23.195\frac{lb}{day}$$

$$0.966\frac{lb}{hr}\times 200\frac{hr}{year}\times\frac{1}{2000}\frac{tons}{lb} = 0.097\frac{tons}{year}$$

ATC No. 0368007 (2000-kW GenSet w/2922-Bhp Engine) Emissions Summary:

	PM-10	SOx	NOx	VOC	CO
lb/hr	0.966	0.031	28.994	1.933	16.752
lb/day	23.195	0.755	695.845	46.390	402.044
tons/yr	0.097	0.0031	2.899	0.193	1.675

8. **ATC No. 0368008 (300-bhp {224-kW} Engine Driving Fire Water Pump):** Example Emission Calculations for PM_{10} (Identical Calculations for SOx, NOx, VOC and CO, results are summarized below):

	PM-10	SOx	NOx	VOC	CO
lb/hp-hr	3.31E-04	1.11E-05	6.17E-03	4.41E-04	5.73E-03

PM_{10}:

$$3.31\times 10^{-4}\frac{lb\cdot PM_{10}}{hp-hr}\times 300\cdot hp = 0.099\frac{lb}{hr}$$

$$0.099\frac{lb}{hr}\times 24\frac{hr}{day} = 2.381\frac{lb}{day}$$

$$0.099\frac{lb}{hr}\times 200\frac{hr}{year}\times\frac{1}{2000}\frac{tons}{lb} = 0.010\frac{tons}{year}$$

ATC No. 0368008 (300-bhp Engine Driving Firewater Pump) Emissions Summary:

	PM-10	SOx	NOx	VOC	CO
lb/hr	0.099	0.003	1.852	0.132	1.720
lb/day	2.381	0.080	44.453	3.175	41.278
tons/yr	0.010	0.0003	0.185	0.013	0.172

7. Emissions Summary:

0368001 (Boiler):	**PM-10**	**SOx**	**NOx**	**VOC**	**CO**
lb/hr:	0.27	0.01	0.39	0.31	1.30
lb/day:	4.02	0.11	5.78	4.59	19.43
tons/yr:	0.67	0.02	0.96	0.77	3.24

0368002 (Heater):	**PM-10**	**SOx**	**NOx**	**VOC**	**CO**
lb/hr:	0.27	0.01	0.39	0.31	1.30
lb/day:	2.68	0.08	3.85	3.06	12.95
tons/yr:	0.07	0.002	0.10	0.08	0.32

0368003 (*HTF Piping):	PM-10	SOx	NOx	VOC	CO
lb/hr:				1.63	
lb/day:				21.39	
tons/yr:				3.90	

*Fugitive emissions only, exhaust emissions assed on '005

0368004 (Vapor Control):	PM-10	SOx	NOx	VOC	CO
lb/hr:				3.13	
lb/day:				6.26	
tons/yr:				1.14	

0368005 (Clng Twr):	PM-10	SOx	NOx	VOC	CO
lb/hr:	0.03				
lb/day:	0.49				
tons/yr:	0.09				

0368006 (Landfarm):	PM-10	SOx	NOx	VOC	CO
lb/hr:				0.01	
lb/day:				0.17	
tons/yr:				0.03	

0368007 (2.0-MW Gen Set):	PM-10	SOx	NOx	VOC	CO
lb/hr:					
lb/day:	Emergency Equipment (Not added to NSRB or SSPE)				
tons/yr:					

0368008 (Firewater Pump):	PM-10	SOx	NOx	VOC	CO
lb/hr:					
lb/day:	Emergency Equipment (Not added to NSRB or SSPE)				
tons/yr:					

Totals:	PM-10	SOx	NOx	VOC	CO
lb/hr:	0.54	0.02	0.77	6.56	2.59
lb/day:	6.72	0.19	9.63	60.51	32.38
tons/yr:	1.23	0.02	1.06	10.49	3.56

IX. EMISSION CHANGES:

A. PROJECT'S EMISSION CHANGE:

Sum of emissions changes for all emissions units to be included in the NSR Balances (NSRB) and the Stationary Source Potentials to Emit (SSPE). (See Page 39)

	PM_{10}	SOx	NOx	VOC	CO
lb/day:	6.72	0.19	9.63	60.51	32.38
tons/yr	1.23	0.02	1.06	10.49	3.56

DECLARATION OF SERVICE
Palen Solar Power Plant Project

Docket No. 09-AFC-7

I, Bonnie Heeley, declare that on May 14, 2010, I served and filed copies of the attached CURE Comments on the Preliminary Determination of Compliance dated May 14, 2010. The original document, filed with the Docket Office, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:
http://www.energy.ca.gov/sitingcases/solar_millennium_palen/index.html

The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Office via email and U.S. mail as addressed below.

I declare under penalty of perjury that the foregoing is true and correct. Executed at South San Francisco, California on May 14, 2010.

/s/
Bonnie Heeley

Alice Harron
Senior Director of Project Development
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-1161
harron@solarmillennium.com

Elizabeth Ingram, Associate Developer
Solar Millennium, LLC
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709
ingram@solarmillennium.com

Arrie Bachrach
AECOM Project Manager
1220 Avenida Acaso
Camarillo, CA 93012
arrie.bachrach@aecom.com

Scott Galati, Esq.
Galati/Blek, LLP
455 Capitol Mall, Suite 350
Sacramento, CA 95814
sgalati@gb-llp.com

Peter Weiner/Matthew Sanders
Paul Hastings Janofsky & Walker LLP
55 2nd Street, Suite 2400-3441
San Francisco, CA 94105
peterweiner@paulhastings.com
matthewsanders@paulhastings.com

California Unions for Reliable Energy
T. Gulesserian/M.D. Joseph/J. Holder
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
tgulesserian@adamsbroadwell.com
jholder@adamsbroadwell.com
(Sent via email only)

Alfredo Figueroa
Californians for Renewable Energy, Inc.
424 North Carlton
Blythe, CA 92225
lacunadeaztlan@aol.com

Holly L. Roberts, Project Manager
Bureau of Land Management
Palm Springs – South Coast Field Office
1201 Bird Center Drive
Palm Springs, CA 92262
CAPSSolarBlythe@blm.gov

Robert Weisenmiller
Commissioner/Presiding Member
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
rweisenm@energy.state.ca.us

Karen Douglas
Chairman/Associate Member
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
kldougla@energy.state.ca.us

Raoul Renaud, Hearing Officer
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
rrenaud@energy.state.ca.us

Kristy Chew, Adviser to Com. Byron
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
kchew@energy.state.ca.us

Alan Solomon, Siting Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
asolomon@energy.state.ca.us

Jennifer Jennings
Public Adviser's Office
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
publicadviser@energy.state.ca.us

California Energy Commission
Attn: Docket No. 09-AFC-7
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

Ram Ambatipudi
Chevron Energy Solutions
150 E. Colorado Blvd., Ste. 360
Pasadena, CA 91105
rambatipudi@chevron.com

Basin and Range Watch
Kevin Emmerich
Laura Cunningham
P.O. Box 153
Baker, CA 92309
atomictoadranch@netzero.net

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

California ISO
e-recipient@caiso.com
(Via Email Only)

DECLARATION OF SERVICE
Palen Solar Power Plant Project

Docket No. 09-AFC-7

I, Bonnie Heeley, declare that on May 25, 2010, I served and filed copies of the attached RESUBMITTAL of CURE Comments on the Preliminary Determination of Compliance dated May 25, 2010. The original document, filed with the Docket Office, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: http://www.energy.ca.gov/sitingcases/solar_millennium_palen/index.html

The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Office via email and U.S. mail as addressed below.

I declare under penalty of perjury that the foregoing is true and correct. Executed at South San Francisco, California on May 25, 2010.

/s/
Bonnie Heeley

Alice Harron
Senior Director of Project Development
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-1161
harron@solarmillennium.com

Elizabeth Ingram, Associate Developer
Solar Millennium, LLC
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709
ingram@solarmillennium.com

Arrie Bachrach
AECOM Project Manager
1220 Avenida Acaso
Camarillo, CA 93012
arrie.bachrach@aecom.com

Scott Galati, Esq.
Galati/Blek, LLP
455 Capitol Mall, Suite 350
Sacramento, CA 95814
sgalati@gb-llp.com

Peter Weiner/Matthew Sanders
Paul Hastings Janofsky & Walker LLP
55 2nd Street, Suite 2400-3441
San Francisco, CA 94105
peterweiner@paulhastings.com
matthewsanders@paulhastings.com

California Unions for Reliable Energy
T. Gulesserian/M.D. Joseph/J. Holder
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
tgulesserian@adamsbroadwell.com
jholder@adamsbroadwell.com
(Sent via email only)

Alfredo Figueroa
Californians for Renewable Energy, Inc.
424 North Carlton
Blythe, CA 92225
lacunadeaztlan@aol.com

Holly L. Roberts, Project Manager
Bureau of Land Management
Palm Springs – South Coast Field Office
1201 Bird Center Drive
Palm Springs, CA 92262
CAPSSolarBlythe@blm.gov

Robert Weisenmiller
Commissioner/Presiding Member
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
rweisenm@energy.state.ca.us

Karen Douglas
Chairman/Associate Member
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
kldougla@energy.state.ca.us

Raoul Renaud, Hearing Officer
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
rrenaud@energy.state.ca.us

Lisa DeCarlo
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
ldecarlo@energy.state.ca.us

Alan Solomon, Siting Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
asolomon@energy.state.ca.us

Jennifer Jennings
Public Adviser's Office
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
publicadviser@energy.state.ca.us

California Energy Commission
Attn: Docket No. 09-AFC-7
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

Ram Ambatipudi
Chevron Energy Solutions
150 E. Colorado Blvd., Ste. 360
Pasadena, CA 91105
rambatipudi@chevron.com

Basin and Range Watch
Kevin Emmerich
Laura Cunningham
P.O. Box 153
Baker, CA 92309
atomictoadranch@netzero.net

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

California ISO
e-recipient@caiso.com
(Via Email Only)