



**Systems Assessment and  
 Facilities Siting Division**

**FILE: 09-AFC-5**

**PROJECT TITLE: Abengoa Mojave Solar Project**

|  |   |  |                   |
|--|---|--|-------------------|
| <input checked="" type="checkbox"/> <b>Telephone</b> | 818-597-3407 x345   | <input type="checkbox"/> <b>Meeting Location: NA</b> |                   |
| <b>NAME:</b>   | William Walters, Aspen  | <b>DATE:</b>   | 1/27/10           |
|  |   | <b>TIME:</b>   | 12:15 pm<br>(PST) |
| <b>WITH:</b>   | See Attendee List Below   |  |                   |
| <b>SUBJECT:</b>                                      | Conference Call for Abengoa Mojave - Therminol® VP-1 Emission Information |  |                   |

**BACKGROUND:** The Energy Commission is currently in the process of licensing several thermal solar power plants that all are proposing to use the same heat transfer fluid (HTF), Therminol® VP-1 that is composed of a mixture of biphenyl and diphenyl oxide. Staff has received from the applicants of these projects several different methods for estimating VOC and air toxic breakdown product emissions from the HTF venting and piping components. The applicant for Abengoa Mojave was the only party to reference information from the HTF supplier. Staff therefore asked the applicant to contact the referenced supplier to get addition information to understand the emissions and operation of the HTF.

**PHONE CONVERSATION:** A conference call was set up between the applicant and their consultants, the HTF supplier Solutia, and Energy Commission air quality staff to discuss HTF emission estimate assumptions. The following parties were on the call

| <u>Attendee</u>         | <u>Affiliation</u>                            |
|-------------------------|---|
| William Walters, P.E.   | Aspen Environmental Group (CEC Consultant)    |
| Gerry Bemis             | Energy Commission staff                       |
| Jacquelyn Leyva         | Energy Commission staff                       |
| Joseph Hughes           | Energy Commission staff                       |
| Tao Jiang               | Energy Commission staff                       |
| <br>                    |   |
| Kathleen Sullivan, P.E. | Abengoa Solar Inc.                            |
| Fred Redell, P.E.       | Abengoa Solar Inc.                            |
| Mehmet Altin, P.E.      | Abener North America (for Abengoa Solar Inc.) |
| Greg Darvin             | Atmospheric Dynamics (for Abengoa Solar Inc.) |
| <br>                    |   |
| Loan Mansy              | Solutia, Inc.                                 |
| Conrad Gamble, P.E.     | Solutia, Inc.                                 |

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|--------------------------|
| <b>DOCKET</b>            |
| <b>08-AFC-2</b>          |
| DATE <u>JAN 27 2010</u>  |
| RECD. <u>FEB 24 2010</u> |

The following technical issues were discussed:

- 1) Breakdown products appropriate for Abengoa Mojave
  - A) A correction to the HTF vent composition provided for data response Item 83 (corrected in Feb. 2, 2010, Second Supplemental Written Response to Data Request Set 1A, submission to the CEC), was provided. Benzene, toluene, and phenol compositions in



the ullage system decomposition off-gas are correctly reported and the remainder is composed of 14.9% biphenyl and 41.2% dipheynl oxide.


- B) If the system is cleaned daily, a more specific estimate for the piping component composition was provided as follows: benzene < 0.1%, phenol 0.25%, toluene – trace, remainder biphenyl and diphenyl oxide in proportions of the pure HTF (26.5% biphenyl, 73.5% diphenyl oxide).
- C) Operating temperatures are 740°F on high side and 560°F on low side during daytime operation, and drops to 440°F overnight.

2) General Technical Issues Regarding Therminol® VP-1 HTF Systems

- A) The total degradation rate is approximately 1 percent per year, including both High Boilers and Low Boilers.
- B) Cleaning frequency impacts the composition of the vent stream and piping stream, where increased frequency reduces the breakdown products in both streams. Therefore, vent and piping chemical compositions would vary from project to project depending on system cleaning/venting frequency.
- C) Increased cleaning frequency also allows for smaller vent emission control equipment.
- D) Solutia performance guidelines for the HTF (i.e. in pipe concentrations) allows up to 10% high boiler breakdown products, but suggest no more than 5%. A maximum of 5% low boiler concentration in the HTF is also recommended.
- E) 1,000 ppm benzene in HTF may have been used as a maximum operating basis for current facilities, which may be due to California waste regulations.

3) Piping Component Emission Factors

- A) Mr. Walters noted that some projects are assuming light liquid emission factors for liquid piping components and others are using heavy liquid/heavy oil emission factors; and noted that regulations are not entirely clear but that U.S.EPA regulatory definitions would suggest that Therminol® VP-1 would be considered a heavy liquid.
- B) Mr. Gamble indicated that he believes that heavy liquid emission factors, rather than light liquid emission factors, have been used for emission estimating purposes from piping liquid piping components for past Therminol® VP-1 projects.

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| <p><b>cc:</b> Dockets for:</p> <p>Abengoa Mojave Solar Project (09-AFC-5)<br/>Blythe Solar Power Project (09-AFC-6)<br/>Palen Solar Power Project (09-AFC-7)<br/>Genesis Solar Energy Project (09-AFC-8)<br/>Ridgecrest Solar Power Project (09-AFC-9)<br/>Beacon Solar Energy Project (08-AFC-2)<br/>San Joaquin Solar 1&amp;2 Hybrid Project (08-AFC-12)<br/>Palmdale Hybrid Power Project (08-AFC-9)</p> |  <p><b>Signed:</b></p> <p><b>Name:</b> William Walters</p> |
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