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DOCKET
09-AFC-5
DATE JAN 11 2010
RECD. JAN 11 2010

January 11, 2010

Commissioner Julia Levin, Presiding Member
Vice Chair James D. Boyd, Associate Member
Mr. Craig Hoffman, Project Manager
Abengoa Mojave Solar Project (09-AFC-5)
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Re: Abengoa Mojave Solar Project (09-AFC-5): Supplemental Written Response to Data Request Set 1A (nos. 1-93) for Air Quality and Public Health

Dear Commissioners Levin and Boyd:

Abengoa Solar Inc. (the "Applicant") hereby files these written responses to certain Data Requests in Set 1A promulgated by Staff on October 22, 2009. The Applicant requested additional time to respond to several Data Requests in Set 1A regarding Air Quality and Public Health in a Notice filed on November 11, 2009. This supplemental response contains responses to those requests including: Data Requests 29, 30, 31, 84, and 87. In addition, this supplemental response contains revised responses to the following: Data Requests 5, 13, 15, 18, 19, 36, 83, 86, and 88.

The Applicant also requested additional time to respond to Data Requests 17 and 85. The Applicant is working to complete the responses to Data Request 17 and 85 as soon as possible and expects to complete these responses by January 15, 2010.

The Applicant appreciates Staff's time and efforts reviewing the enclosed materials. The Applicant looks forward to working with Staff to achieve complete and satisfactory resolution of all issues in a timely manner.

Thank you for your time and consideration of this matter.

Sincerely,

Christopher T. Ellison
Shane E. Conway
Ellison, Schneider & Harris, L.L.P.

Attorneys for Abengoa Solar Inc.

Attachment

Table of Contents

Air Quality

FUGITIVE DUST UNPAVED ROAD EMISSIONS CALCULATIONS

Item 5 (Revised):

Information Required:

Please identify if the applicant is willing to stipulate to graveling the onsite unpaved roads during construction before they are sealed to reduce the silt loading, or provide additional surface soils sieve data that shows that the 5.3 percent silt content assumption is representative of the site.

Response:

The applicant will stipulate to the sealing, graveling, and paving of on-site roads prior to major construction activity. The emissions from operational onsite traffic on unpaved roads have been revised using a silt factor of 14%, based on new geotechnical information provided by the applicant.

CONSTRUCTION EMISSIONS - ON-ROAD VEHICLE USE ASSUMPTIONS

Item 13 (Revised):

Information Required:

Please describe how the trip distance assumptions for construction were determined for each vehicle type/use.

Response:

Table C.5-7 (revised) indicates the types of vehicles, numbers of vehicles, and estimated mileages for vehicles proposed for construction support activities. Vehicle mileages are based on a round trip length of 50 miles from the Barstow urban area (which includes the Barstow rail yard site).

The 50 mile round trip distance is conservative, since the Barstow urban area, as well as the Barstow rail yard, are approximately 22 miles from the project site.

Additional General Comment: See the Socioeconomic section of the AFC for further discussion of labor issues, etc.

Item 15 (Revised):

Information Required:

Please include the personal vehicle trip mileage, necessary for construction employees to get to the assumed construction employee busing locations, in the construction emission estimate.

A. Please estimate the on-site whole round trip travel including unpaved road travel and corresponding emissions for all on-road construction vehicles, including heavy duty delivery trucks, light service and delivery trucks, personal vehicles and buses, etc. necessary to complete the construction activities throughout the project site.
B. Please correct, based on revisions to the round-trip distance assumptions, the on-road (paved and unpaved) vehicle tailpipe and fugitive dust emissions.

Response:

The applicant has included this mileage in the worker travel VMT (Table C.5-5), based upon the following assumptions:

- Average number of workers on site per day = 830
- Average number of workers bussed per day = 576
- Assumed round trip distance to the bus yard = 60 miles (30 mile radius around the bus yard encompasses the entire Barstow urban and non-urban area) (per Figure 5.13-1, Traffic and Transportation).
- Assumed round trip distance for non-bussed workers = 60 miles
- Total daily VMT ~= 34,560
- Total period VMT ~= 19,319,040

A. This is provided in Table C.5-5 for all phases of construction. The emissions from on-site unpaved road use during construction are included in the overall site fugitive dust and equipment exhaust calculations presented in Table C.5-5 for the various phases of project construction, i.e., rough grading and site preparation, finish grading, power block erection, and solar field erection. Emissions from delivery vehicles, light duty support vehicles, worker vehicles, and buses are also included in Table C.5-5.
B. The emissions for construction activities (fugitive dust and equipment exhaust) have been revised (see Tables C.5-5, C.5-6, and C.5-7).

CONSTRUCTION EMISSIONS DISPERSION MODELING

Item 17 (Pending):

Information Required:

Please explain the rationale as to why the locations for the volume and area source emission inputs did not change from short-term to annual modeling, or please provide annual construction modeling that matches the extent of annual construction activities.

Response:

This item continues to be under review. A response is expected to be submitted by January 15, 2010.

OPERATING EMISSIONS – ON-SITE VEHICLE USE ASSUMPTIONS

Items 18 and 19 (Update):

Table C.1-7 has been revised and should be referred to in the review of these Data Responses.

OPERATIONS EMISSIONS DISPERSION MODELING

Item 29 (Initial Response, per Extension Request):

Information Required:

Please provide a revised operations modeling analysis, which includes all on-site operations emission sources including the facility operations maintenance emissions and fugitive dust emissions as well as any revisions to the onsite operation emissions determined through the response to the other air quality data requests.

Response:

Revised modeling was performed to include all on-site operations emission sources including the facility operations maintenance emissions and fugitive dust emissions as well as any revisions to the onsite operations emissions determined through the response to the other air quality data requests. The revised operations emissions calculations, and modeling input and output files, as well as the impact summary are provided on the enclosed CD.

Operations Emissions Summary

In addition, revised Table 5.2-6 presents the emissions summation for the proposed facility operations phase. The emissions totals include the following operations phase equipment or systems: (1) HTF system boilers, (2) HTF system VOC, (3) cooling towers, (4) stationary IC engines, and (5) onsite mobile sources, fuel storage tanks, and fugitive dust.

Table 5.2-6 Summary of Facility Operational Emissions for the Project

Pollutant	lbs/hr	lbs/day	tons/year
Stationary Sources			
NO_x	47.1	58	3.1
CO	5.4	43	2.1
VOCs	5.03	48.2	7.2
SO_x	0.06	0.64	0.03
PM_{10}	2.0	30.2	4.43
$PM_{2.5}$	1.5	21.3	2.8
CO2e	-	-	11211
Mobile Sources			

Table 5.2-6 Summary of Facility Operational Emissions for the Project			
Pollutant	**lbs/hr**	**lbs/day**	**tons/year**
NO_x	0.384	9.21	1.68
CO	0.23	5.48	1.0
VOCs	0.07	1.65	0.3
SO_x	0.0007	0.016	0.003
PM_{10}	0.026	0.61	0.112
$PM_{2.5}$	0.026	0.61	0.112
CO2e	-	-	132
Onsite Fugitive Dust			
PM10	4.25	102.1	18.6
PM2.5	0.9	21.7	4.0
The engines will not run in the same hour or on the same day. Lbs/hr and lbs/day are based upon the maximum single engine emissions. Onsite mobile equipment exhaust emissions are included but are not subject to NSR or PSD rule applicability inclusion, nor are they subject to the MDAQMD NSR rule offset provisions. Onsite fugitive dust emissions generated by onsite mobile equipment are included. Onsite mobile equipment fugitive dust emissions are not subject to NSR or PSD rule applicability inclusion, nor are they subject to the MDAQMD NSR rule offset provisions. Offsite mobile emissions such as employee commute and delivery emissions are not included.			

Table DR-29 presents a revised summary of the operational emissions impacts.

Table DR29 Air Quality Impact Summary for Normal Operating Conditions

Pollutant	Avg. Period	Maximum Concentration ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total ($\mu g/m^3$)	Class II Significance Level ($\mu g/m^3$)	SIL ($\mu g/m^3$)	Ambient Air Quality CAAQS/NAAQS ($\mu g/m^3$)	
NO_2[a]	1-hr	130	154	284	-	19	339	-
	Annual	0.18	42	42.2	1	1	57	100
PM_{10}	24-hr	8.8	154	163	5	5	50	150
	Annual	2.3	38.4	40.7	1	1	20	
$PM_{2.5}$	24- hr	4.4	28	32.4	5	5	-	35
	Annual	0.7	10.4	11.1	1	1	12	15.0
CO	1- hr	76	4025	4101	2000	2000	23,000	40,000
	8- hr	7.8	1789	1797	500	500	10,000	10,000
SO_2	1- hr	0.25	94	94.3	-	-	655	-
	3- hr	0.18	23	23.2	25	25		1,300
	24- hr	0.07	13	13.1	5	5	105	365
	Annual	0.003	3	3.00	1	1	-	80

[a]ARM applied for annual average, using national default 0.75 ratio.

EMISSIONS OF VOLATILE ORGANIC COMPOUNDS (VOCS) FROM THE HEAT TRANSFER FLUID (HTF) - EMISSION CONTROLS AND EMISSIONS ESTIMATE

Item 30 (Initial Response, per Extension Request):

Information Required:

Please identify whether the applicant is willing to stipulate to the incorporation of a carbon adsorption, or other VOC control system, to control VOC emissions from the HTF expansion system venting by at least 98 percent. If unwilling to stipulate to this condition, please identify the basis for this position.

Response:

The Applicant proposes the following system for VOC control from the HTF expansion system.

NITROGEN VENTING OF THE HEAT TRANSFER FLUID SYSTEM

HTF Expansion System Basis

The heat transfer fluid (HTF) will be either Therminol VP-1 produced by Solutia, Inc. or Dowtherm A produced by Dow Chemical Company. Both materials are comprised of diphenyl oxide (73-73.5%) and biphenyl (26.5-27%). These materials in gaseous form represent VOCs with biphenyl and are classified as a hazardous air pollutant (HAP).

The Mojave project has two identical Alpha and Beta plants. The numbers on the following flow diagram are totals for both plants together. The HTF system of each plant will consist of 5 vertical ASME-rated expansion tanks, one nitrogen-condensing ASME-rated tank (same size as expansion tank) and two vertical HTF storage tanks.

These expansion tanks and the nitrogen condensing tanks will be sized such that during normal operation the expansion/contraction of the HTF will be kept within these tanks and an initial fill of nitrogen will also be kept within tanks by allowing the nitrogen/vapor space pressure to vary from 3 bara to 11 bara nominally. However, after filling all pipes initially at ambient temperature (with high density – lower specific volume), the expansion of the HTF from the ambient temperature to the daily operating temperatures will push the HTF that is not needed in the system during daily operation from the expansion tanks into two storage tanks that will be kept cooler (at about 165 °F) and blanketed with 2-15 inches Water Column (in. WC) nitrogen pressure.

During daytime operation, when the HTF is heated and expands, the expanded volume will move into the expansion tanks and the nitrogen will be compressed and pushed into the nitrogen condensing tank. At night when the HTF cools and contracts, the HTF will move back into the piping and the nitrogen in the vapor space will expand into the expansion tanks.

After some time of operation some of the HTF will break down into Low Boilers (LB's) such as Benzene, Phenol, etc.; and High Boilers (HB's) – heavier sludge. After a few years of operation, these HB's and LB's will accumulate to high enough concentrations that they need to be removed from the system.

Although venting would be limited by letting the nitrogen space pressure rise and fall as necessary to keep it contained within the expansion and nitrogen condensing tanks, the LB's which will be released into the vapor space at operating temperature will be removed from nitrogen space by condensing them in the nitrogen condensing tank by cooling them in the tank to about 176 °F.

HB's will be removed from the system through a side stream distillation system.

Types of Venting

There are two types of venting from HTF system:

- the daily venting of nitrogen due to HTF Storage Tank breathing
- venting of low boilers (HTF degradation products)

Daily Breathing Venting: As indicated above, during most normal operation there will be no exchange of HTF or nitrogen between expansion tanks and the storage tanks. However in unusual cases when the HTF temperature swings outside of the normal daily range, some hotter HTF and nitrogen may need to be transferred from expansion tanks into the storage tanks and vice versa. During these unusual exchanges the storage tank levels will fall and rise, thus requiring nitrogen space venting. The worst case would be if the HTF system got very cold (limited to 100 °F) in which case all the HTF from the storage tanks will be pumped into the system; and next time the system is brought back to normal operation, all HTF that was pumped out of the storage tanks will return to the storage tanks. Under that condition, the total amount of nitrogen vented is calculated to be 66,530 cu ft or 5200 lb/hr total for both plants.

The storage tanks have coolers on their vent stacks. Nitrogen and HTF mixture to be released passes through the vent coolers, cooled to 120 °F, that will condense most of the HTF vapor vented from the storage tanks before reaching atmosphere. The storage tanks are maintained at 165 ºF to minimize HTF venting. The HTF storage tank has a liquid HTF air cooler to maintain this tank's temperature at 165 ºF.

Low Boilers Venting: As the HTF is normally cycled from 428ºF to 740ºF every day, there will be some degradation of the HTF. This degradation will result in primarily phenol and benzene with smaller concentrations of toluene and naphthalene. These degradation products will affect the thermal efficiency of the HTF and increase vapor pressure.

As the HTF daily moves into and out of the expansion tanks, the LB's along with some vaporous HTF will be released into the vapor space. To help this separation of LB's into the vapor space, a side stream of HTF will also be sprayed to the top of the expansion tanks continuously. When the expansion tanks fill up with HTF and compress the nitrogen+vapors into the nitrogen condensing

tanks which will be kept cooled to 176 °F, the LB's along with a large amount of HTF vapor will be condensed.

The HTF+LB's condensate will be sent to an HTF LB's and HB's Cleaning System in which the HTF will be recovered as much as achievable with a distillation system. The LB's will be pulled out of the top of the distillation unit and most of the LB's along with some residual HTF will be condensed at about 120 °F (with cooling water) and collected in a tank to be disposed/sold for heat value. The non-condensibles will then be vented through a single point (the same point) as the storage tanks vents.

As the concentrations of the LB's increases in the HTF system, more and more LB's will be released, condensed and recovered until daily degradation equals to the amount recovered for disposal plus a small amount that is vented to atmosphere along with nitrogen. Based on Solutia's simulations and lab and field tests, daily degraded low boilers are calculated to be approximately 46.5 lbs/day per plant (93 lbs/day total for both plants).

Low Boilers Removal Scheme: The HTF system is sized to not require nitrogen venting due to HTF expansion. However, to purge low boilers from the system, the expansion tanks will be vented at regular intervals instead of once per year recommended by HTF vendor. The amount of nitrogen vented is the volume of five expansion tanks from 0 to 90% volume. This vented nitrogen at 11 bars (159.5 psia) will include small amounts of HTF and HTF degraded by-products, the LB's. An ASPEN simulation predicted that it is better to condense low boilers under pressure than by expanding the mixture and cooling it (scrubbing through a cooler pool of liquid) in the HTF Storage Tank followed by atmospheric condensation. The expansion tanks' vent stream is cooled to 176 °F at 159.5 psia through a HTF-cooled nitrogen condenser and pressurized condensing tank. The majority of nitrogen is recycled back to the expansion tanks. Condensed HTF along with the low boilers are sent to a HTF Cleaning System.

This continuous cleaning system operating 8 hours/day is a side-stream distillation for removal of high boiling degradation products called high boilers consisting of dibenzofuran, phenoxy biphenyl isomers, terphenyl, quaterphenyls, and phenoxy-polyphenyl compounds. These high boilers form over time in HTF which must be effectively managed for extending fluid life. This can be done by either dilution (replacement of old fluid with new fluid) or on-site distillation. A small side stream of in-service heat transfer fluid is continuously fed into a distillation unit. The HTF and LB's originating from the expansion tanks are removed in the two separate overhead streams cut at different temperatures. An HTF stream containing small amounts of high and low boilers, taken as a middle stream from the distillation unit, is condensed and returned to service through the HTF Expansion Tanks. The LB's stream, taken as a top overhead stream from the distillation unit, is condensed at 120 °F, stored in a slightly pressurized tank and disposed of as a hazardous liquid. The bottoms stream is enriched in HB's (and insoluble solids), which are removed for disposal either as a hazardous liquid or sent to the HTF vendor under EPA "used oil" regulations for credit on recoverable HTF. The vent stream from the distillation unit will be combined with HTF Storage Tank breather vent and cooled to 120 °F through a water-cooled condenser to recover HTF and returned to HTF Storage Tank.

Release Control Efficiency: Maximum VOC emissions from nitrogen venting are thus 5.1 lb/day HTF with a maximum of 27% or 1.38 lb/day comprised of biphenyl, a hazardous air pollutant (HAP) and 4 lbs/day of benzene, toluene, and phenol. The Title V threshold for hazardous air pollutants is 10 tons/year for any individual HAP. So the HTF and benzene release as calculated is much less than the maximum level allowed. Since the expansion is expected to take place over the course of more than one hour in the morning, the maximum hourly emissions is also the same as daily maximums.

Based on the calculations submitted, this control reduces the potential mass of HTF released from 6867 lbs/day to 5.1 lbs/day resulting in a control efficiency of about 99.9%. Low boilers are reduced from 96 lbs/day to 4 lbs/day resulting in a control efficiency of about 95.8%.

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

Emissions Summary

Therefore, the HTF tanking and venting system will result in VOC (HTF plus low boiler compounds) emissions on the order of 1.1375 lbs/hr, 9.1 lbs/day (based on 8 hours/day of venting), 3322 lbs/year, or 1.66 tpy for the entire facility. VOC emissions for a single power block would be approximately 0.57 lbs/hr, 4.55 lbs/day (based on 8 hours/day of venting), 1661 lbs/yr, or 0.831 tpy.

Waste hauling (total load-out emissions for the 250 MW facility) will be approximately 0.0013 lbs/hr, 0.0013 lbs/day, 0.0157 lbs/yr, or 7.84E-6 tpy. These emissions are based on the following data and assumptions:

a. 12 facility load-outs per year (1 per month) maximum.

b. 2 hours per load-out (1 hour at each power block). The actual load-out pumping or transfer time will be less than an hour, but an hour was used as the basic emissions period.

c. VOC emissions loss rate is ~0.0013 lbs/hr (based upon the haul truck evacuated vapor space volume and VOC concentration in the vapor per facility load-out).

HTF VOC fugitive emissions from valves, flanges, pumps, seals, etc., will be 2.44 lbs/hr, 26.42 lbs/day, 9644.7 lbs/year, or 4.82 tpy, based on the data and assumptions in the attached VOC Component Count and Emissions spreadsheet.

Table DR30 presents a summary of the revised estimated facility-wide HTF VOC system emissions.

Table DR30

HTF Component	Lbs/hr	Lbs/Day	Lbs/Yr	TPY
Tanks/Venting	1.1375	9.1	3322	1.66

Fugitives	2.44	26.42	9644.7	4.82
Waste Load Out	0.0013	0.0013	0.016	7.6E-6
Total VOC	*3.58*	*35.52*	*12967*	*6.48*

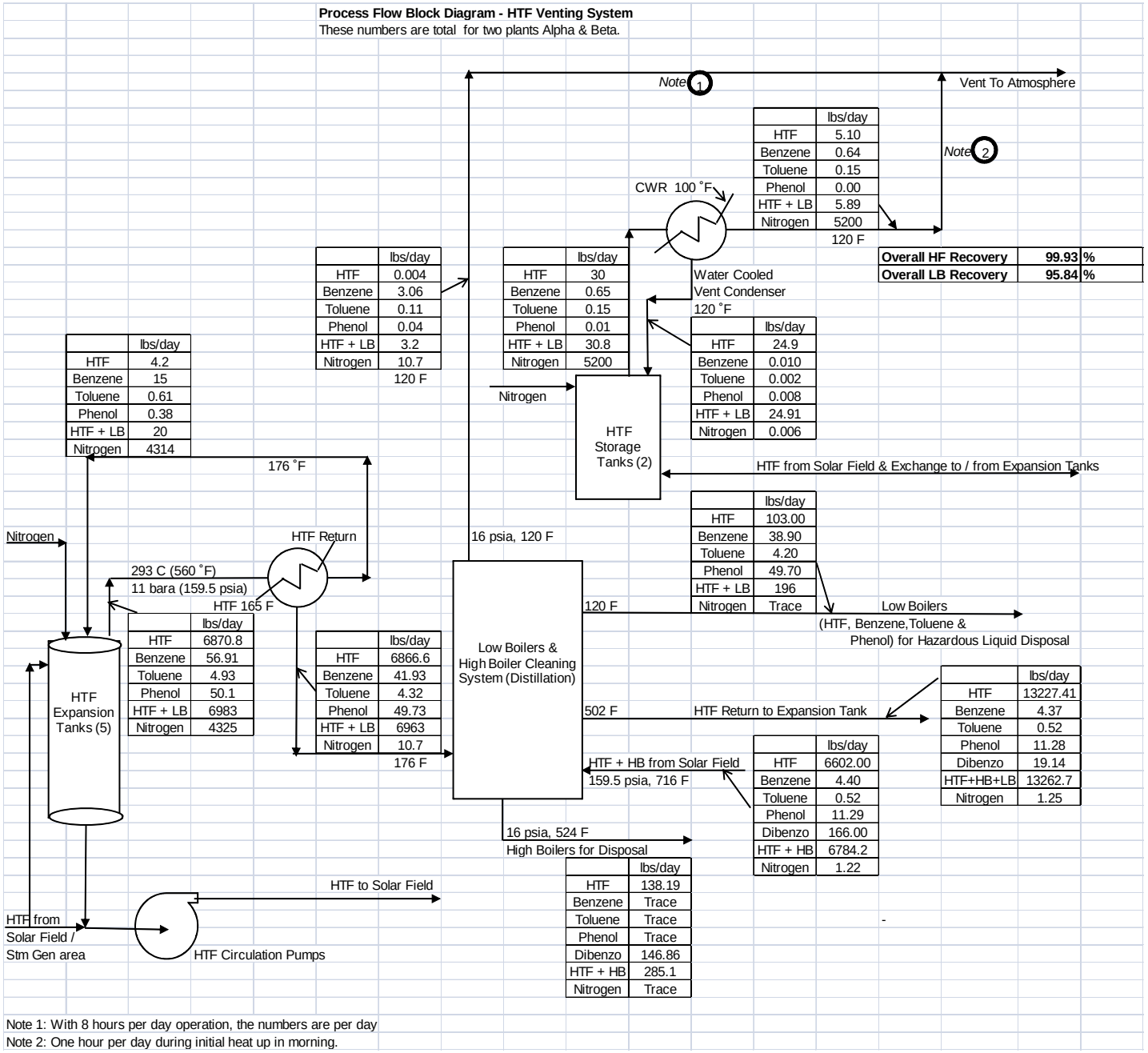
Item 31 (Initial Response, per Extension Request):

Information Required:

Please estimate the piping component HTF leakage and resulting fugitive VOC emissions, including providing a piping component count.

Response:

Please see response to Item 30 above.



	lbs/day
HTF	5.10
Benzene	0.64
Toluene	0.15
Phenol	0.00
HTF + LB	5.89
Nitrogen	5200

	lbs/day
HTF	0.004
Benzene	3.06
Toluene	0.11
Phenol	0.04
HTF + LB	3.2
Nitrogen	10.7

	lbs/day
HTF	30
Benzene	0.65
Toluene	0.15
Phenol	0.01
HTF + LB	30.8
Nitrogen	5200

Overall HF Recovery	**99.93 %**
Overall LB Recovery	**95.84 %**

	lbs/day
HTF	24.9
Benzene	0.010
Toluene	0.002
Phenol	0.008
HTF + LB	24.91
Nitrogen	0.006

	lbs/day
HTF	4.2
Benzene	15
Toluene	0.61
Phenol	0.38
HTF + LB	20
Nitrogen	4314

	lbs/day
HTF	103.00
Benzene	38.90
Toluene	4.20
Phenol	49.70
HTF + LB	196
Nitrogen	Trace

	lbs/day
HTF	6870.8
Benzene	56.91
Toluene	4.93
Phenol	50.1
HTF + LB	6983
Nitrogen	4325

	lbs/day
HTF	6866.6
Benzene	41.93
Toluene	4.32
Phenol	49.73
HTF + LB	6963
Nitrogen	10.7

	lbs/day
HTF	13227.41
Benzene	4.37
Toluene	0.52
Phenol	11.28
Dibenzo	19.14
HTF+HB+LB	13262.7
Nitrogen	1.25

	lbs/day
HTF	6602.00
Benzene	4.40
Toluene	0.52
Phenol	11.29
Dibenzo	166.00
HTF + HB	6784.2
Nitrogen	1.22

	lbs/day
HTF	138.19
Benzene	Trace
Toluene	Trace
Phenol	Trace
Dibenzo	146.86
HTF + HB	285.1
Nitrogen	Trace

Item 36 (Revised):

Information Required:

Please confirm that there will be no gasoline storage at the site and that either fuel/lube trucks will be used for onsite refueling or vehicles will have to drive to the nearest gasoline station, which is over 30 miles from the site, to refuel. If gas storage is used at the site, please provide information for any proposed onsite gasoline storage including throughput information and permitting requirements.

Response:

The nearest gasoline station services are actually not 30 miles from the site, but available at Kramer Junction (intersection of Hwy 58 and Hwy 395), approximately 19 miles driving distance from the site. The applicant is considering the installation and use of an onsite gasoline tank and an onsite diesel fuel tank. The proposed tank size is 2000 gallons capacity each, with Phase I vapor recovery (balance system) installed on the gasoline tank. The appropriate permit application forms will be filed with the MDAQMD.

Assuming that each tank has maximum storage capacity of 2000 gallons, with the annual throughputs as follows: (1) gasoline ~ 18,000 gallons, and (2) diesel ~ 25,000 gallons, the VOC emissions (working and breathing losses) would be 0.028 lbs/hr, 0.65 lbs/day, and 0.12 tpy. (See attached emissions calculation sheets for both fuels.)

Public Health

Item 83 (Revised):

Information Required:

Please describe and discuss the potential for all toxic thermal degradation products of HTF.

Response:

According to the MSDS for both Therminol-VP1 and Dowtherm-A as provided in Appendix C.1 of the AFC, note the following:

1. Both fluids are stable under normal conditions of handling and storage.
2. Neither fluid has the potential to undergo hazardous polymerization.
3. Both fluids have compound characteristics similar to the RCRA class of chemicals identified as category D018 (benzene).
4. Both fluids can decompose at elevated temperatures.
5. Decomposition products may include "trace" amounts of benzene and phenol.

According to data provided by the HTF manufacturer and the HTF system designer, as analyzed by the project engineering staff (using the Aspen Plus Model, version 2006.5), the amounts and types of hazardous air pollutants in the ullage system decomposition off-gas would be approximately as follows:

- Benzene wt% of total VOC = 40.6%
- Phenol wt% of total VOC = 0.44%
- Toluene wt% of total VOC = 2.86%
- Biphenyl wt% of total VOC = 26.5%

For the breakdown of HAPs in the solar field components, the MSDS sheet states that the decomposition products of benzene and phenol occur in "trace amounts". For purposes of calculating the HAPs emissions from the component fugitives in the solar field, a value of 5% by wt of total VOCs of each compound (except biphenyl at 26.5%) was used as an upper limit representative of a "trace amount".

The following table presents the estimates of emissions for the identified degradation products from the various HTF subsystems.

Table ** Summary of HTF Subsystem Degradation Product Emissions

HTF Subsystem	Units	Benzene	Phenol	Toluene	Biphenyl

Tank/Ullage Venting	Lbs/hr	0.463	0.005	0.0325	0.172
	Lbs/day	3.7	0.04	0.26	1.38
	Tons/Yr	0.675	0.0073	0.0475	0.252
Component Fugitives	Lbs/hr	0.122	0.122	neg	0.647
	Lbs/day	1.321	1.321	neg	7.0
	Tons/Yr	0.241	0.241	neg	1.278
Waste Load Fugitives	Lbs/hr	neg	neg	neg	neg
	Lbs/day	neg	neg	neg	neg
	Tons/Yr	neg	neg	neg	neg

Item 84 (Initial Response, per Extension Request):

Information Required:

Please provide emission factors and a health risk assessment on the emissions of toxic thermal degradation products of HTF.

Response:

Emissions factors for HTF decomposition products are discussed in Items 30 and 83 above. These emissions along with the revised emissions per the enclosed data responses were re-evaluated for overall facility risk. The revised facility HRA values are presented in the response to Item 87.

Item 85 (Pending):

Information Required:

Please provide DPM emission factors from construction activities and a health risk assessment for diesel construction equipment emissions.

Response:

This item continues to be under review. A response is expected to be submitted by January 15, 2010.

Item 86 (Revised):

Information Required:

Please provide DPM emission factors for on-site solar field and equipment maintenance activities in pounds per day and tons per year. This value can be submitted as a single number estimate of total emissions from all vehicular sources used on-site.

Response:

Table C.1-7, which has been slightly revised, is attached. This table indicates the DPM emissions and emissions factors used to estimate on-site facility operations and maintenance emissions. DPM emissions values presented in the original table, as well as the revised table, are given in

terms of lbs/VMT, lbs/hp-hr, lbs/avg day, lbs/year, and tons/yr. DPM emissions in terms of lbs/day, although given, are not used in the HRA since an acute REL has not been established for DPM.

Item 87 (Initial Response, per Extension Request):

Information Required:

Please conduct a health risk assessment for diesel emissions from vehicles involved in on-site solar field and equipment maintenance activities during plant operations.

Response:

Revised emissions values and operational scenarios for the facility were re-evaluated using HARP. The revised HRA values for the facility are as follows:

Boilers, Stationary Engines, Cooling Towers, HTF System, Mobile Ops Vehicles		
Risk Category	**MIR Project Values**	**Applicable Significance Threshold**
Cancer Risk	6.85 E-6	See Table 5.10-4 in Section 5.1 (Air Quality)
Chronic Hazard Index	0.00992	
Acute Hazard Index	0.0087	
Cancer Burden	0.0001[1]	
MIR Receptor #: 302 , and location 473151mE, 3873400mN. Acute MIR, Receptor #130, HI=0.026, 469945mE, 3874500mN.		

* No acute REL has been established for diesel PM.

[1] The 10^{-6} MIR radius is located ~1815 ft. from the site center. The estimated population within this radius is less than 100 individuals, therefore the cancer burden is 0.0001

The input and output files applicable to the revised HRA are included on the CD which accompanies these responses.

Item 88 (Revised):

Information Required:

Please provide a cumulative PM2.5 emissions estimate on a daily and yearly basis when fugitive dust emissions are added to the DPM emissions from the above stationary and mobile sources, assuming that all DPM from diesel engines are PM2.5.

Response:

Please see the emissions summary table in response to Item 29 above.

Table C.5-7 Offsite Equipment and Manpower Schedules
Offsite Construction Vehicles

VEHICLE TYPE	HP	Fuel Type	Load Factor (%)	USAGE DESCRIPTION
Off-Site Flat Bed Trucks (From Rail Facility)	200	gasoline		Material Hauling
Off-Site Asphalt Trucks	200	diesel		Asphalt Hauling
Off-Site Concrete Trucks	310	diesel		Concrete Delivery
Off-Site Construction Worker Commute	180	gasoline		Personal vehicle (see commute table below)
Off-Site Dump Trucks	275	diesel		Material Hauling
Off-Site Low Boy Trucks (From Rail Facility)	250	diesel		Material Hauling
Off-Site Pickup Trucks	200	gasoline		Light duty material hauling
Off-Site Pipe Hauling Trucks (From Rail Facility)	250	diesel		Piping material hauling
Off-Site Water Trucks	250	diesel		Dust suppression water
Off-Site Fuel/Lube Trucks	200	gasoline		Mobile fuel & lubrication services
Off-Site HTF Delivery Trucks (From Rail Facility)	250	diesel		Delivery of HTF (transfer from rail yard)
Off-Site Box Van Trucks	200	diesel		Material Hauling (Small items / Dry Requirement Items)

Note: Use separate sheet (Site Construction Equipment) for on-site vehicles

Average Vehicle Miles Traveled per Day and Number of Vehicles

VEHICLE TYPE	Mi./ Veh.-Day*	Number M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26
Off-Site Flat Bed Trucks (From Rail Facility)	50	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	2	2
Off-Site Asphalt Trucks	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	2
Off-Site Concrete Trucks	50	1	12	46	46	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	46	46	46	37	14	4
Off-Site Dump Trucks	50	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Off-Site Low Boy Trucks (From Rail Facility)	50	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1
Off-Site Pickup Trucks	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
Off-Site Pipe Hauling Trucks (From Rail Facility)	50	0	0	0	0	0	0	0	0	0	3	4	5	5	5	5	5	5	5	4	2	0	0	0	0	0	0
Off-Site Water Trucks	50	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Off-Site Fuel/Lube Trucks	50	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Off-Site HTF Delivery Trucks (From Rail Facility)	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2	2	2	2	2	2
Off-Site Box Van Trucks	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	1	0

Daily Mileage Accumulation

VEHICLE TYPE	Mi./ Veh.-Day*	Vehicle-Miles-Traveled (mi/day) M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	VMT		Const Period Delivery data diesel VMT	gasoline VMT
Off-Site Flat Bed Trucks (From Rail Facility)	50	50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	150	150	150	150	150	150	150	100	100	62350	gasoline	**1429750**	**94600**
Off-Site Asphalt Trucks	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	150	150	150	100	15050	diesel		
Off-Site Concrete Trucks	50	50	600	2,300	2,300	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,300	2,300	2,300	1,850	700	200	1266350	diesel		
Off-Site Dump Trucks	50	50	50	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4300	diesel		
Off-Site Low Boy Trucks (From Rail Facility)	50	50	50	50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	50	50	50525	diesel		
Off-Site Pickup Trucks	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	50	50	50	50	0	5375	gasoline		
Off-Site Pipe Hauling Trucks (From Rail Facility)	50	0	0	0	0	0	0	0	0	0	150	200	250	250	250	250	250	250	250	200	100	0	0	0	0	0	0	51600	diesel		
Off-Site Water Trucks	50	50	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3225	diesel		
Off-Site Fuel/Lube Trucks	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	0	26875	gasoline		
Off-Site HTF Delivery Trucks (From Rail Facility)	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	100	100	100	100	100	100	100	100	18275	diesel		
Off-Site Box Van Trucks	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	50	0	20425	diesel		
																											Total	1524350		

Off-Site Construction Workers Bussing Adjustments

Total		**173**	**244**	**321**	**411**	**680**	**862**	**898**	**948**	**968**	**998**	**1086**	**1081**	**1127**	**1149**	**1144**	**1139**	**1162**	**1155**	**1130**	**1069**	**1051**	**946**	**885**	**607**	**217**	**138**		
Solar Collector Array Facility (included in Total)					10	150	298	298	298	298	298	298	298	298	298	298	298	298	298	298	298	298	298	298	150			5674	people
Supervisors/Management/Admin (included in Total)		8	24	35	45	65	75	75	75	75	85	85	85	85	85	85	85	85	80	75	75	75	55	55	55	30	15	1672	people
Final Off-Site Construction Worker Commute (people, not vehicles)		**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**	**M13**	**M14**	**M15**	**M16**	**M17**	**M18**	**M19**	**M20**	**M21**	**M22**	**M23**	**M24**	**M25**	**M26**		
Day Shift - non Bussed		49	79	107	137	219	247	256	269	274	285	307	306	317	323	322	320	326	322	314	299	294	260	244	175	77	46	6173	people
Day Shift - Bussed		124	165	215	275	461	575	602	640	655	668	734	730	765	781	777	774	791	790	776	731	717	657	612	403	140	92	14648	people
Evening Shift - non Bussed							25	25	25	25	28	28	28	28	28	28	28	28	26	25	25	25	18	18	18			479	people
Evening Shift - Bussed (if available)							15	15	15	15	17	17	17	17	17	17	17	17	16	15	15	15	11	11	11			290	people
check cells		TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE		
* Maximum One-way haul distance (backhaul not included since trucks are not dedicated to site or project)																													
Day shift non-bussed total worker vehicles assuming 20% carpool		39	63	85	109	175	198	205	215	219	228	246	245	254	258	257	256	261	258	251	239	235	208	195	140	61	37		
Day shift total buses (roundtrips)		3	3	4	6	10	12	13	13	14	14	15	15	16	16	16	16	16	16	16	15	15	14	13	8	3	2	Total	
Evening shift total worker vehicles assuming no bussing and 20% carpool		0	0	0	0	0	32	32	32	32	36	36	36	36	36	36	36	36	34	32	32	32	23	23	23	0	0	Trips	Total VMT
Total Vehicle Trips (non-bussed) per month		847	1359	1832	2348	3763	4932	5087	5302	5388	5680	6059	6037	6235	6330	6308	6287	6386	6274	6085	5822	5745	4967	4704	3509	1320	787	119390	7163370
Total Bussed Vehicles Trips per month		55	74	96	123	207	258	270	287	293	299	329	327	342	350	348	346	354	354	348	327	321	294	274	181	63	41	6561	393658

Max workers per month (assume pre day is same value):	1162	
Avg workers per month (assume pre day is same value):	830	
Assume all trips for worker commute are from Barstow:	60	miles roundtrip

(1) delivery trips from BNSF Barstow and urban area
(2) commute trips from Barstow urban area or commute staging area
(3) delivery trips only one way as non-dedicated to site
(4) commute trip distance is roundtrip
(5) assume bus capacity is 48 people
(6) assume evening shift is all non-bussed

FIXED ROOF TANK EMISSION CALCULATION

Reference: AP-42, Section 7.1, 9/97

Emissions Scenario

		X	: PTE		
***** Input *****			: Actual		
Number of Similar Tanks:	1		Year:	Any	
Stored Substance ID:	Diesel Fuel		Tank Cap.	2000	gallons
Tank ID:	Tank 1		Kn =	70.175	* Eq 41
Vapor Molecular Wt.:	130	Table 6*			
Vapor Pressure (psia):	0.00648	Table 6*			
Tank Diameter (ft):	6				
Tank Height/Length (ft):	9.5				
Avg. Vapor Space Height (ft):	4				
Avg. Diurnal Temp Change (degF):	28	Table 4 (Phoenix data used to simulate site)*			
Paint Factor:	1				
Small Tank Adj. Factor:	1				
Product Factor:	1	* Section 19.1.2.2.3.3			
Turnover Factor:	0.59				
Throughput (gals/yr):	25000				

Intermediate Calculations

TP =	25.00
Q =	0.01
D =	22.19
H =	2.03
T =	5.29

***** Output *****	Single Tank	All Tanks
Uncontrolled Emissions		
Breathing Loss (lb/yr):	3.66	3.66
Working Loss (lb/yr):	0.30	0.30
Total VOC Losses (lb/yr):	3.96	3.96
Controlled Emissions		
Control System Eff. (frac):	0	0
Total VOC Losses (lb/yr):	3.96	3.96
(lb/day):	0.0108	0.0108
(lb/hr):	0.0005	0.0005
(TPY):	0.0020	0.0020

Additional References: *API Bulletin #2518, October 1991
TTECI-2007

GASOLINE TANK EMISSION CALCULATION

Reference: AP-42, Section 5.2, 6/08

***** Input *****	Facility Type/ID:	Facility Tank

Program is Applicable to All Grades/Types of Gasoline

UNDERGROUND TANK FILLING	lb/1000 gal *	Table 5.2-7 Values
Balanced Submerged Filling:	0.3	Phase 1 Varec
Submerged Filling:	0	
Splash Filling:	0	
Tank Breathing:	1	
Spillage:	0.7	

VEHICLE REFUELING	
Controlled:	0
Uncontrolled:	11
Tank Throughput (gals/yr):	18000

Intermediate Calculations

TP =	18
EF =	13

***** Output *****

Total VOC Losses (lb/yr):	234
(lb/day):	0.64
(lb/hr):	0.027
(TPY):	0.117

* Enter 0 for any category which is not applicable.

Operations Vehicle Emisisons from Site Deliveries

Operations Site Delivery Emissions

Deliveries per Avg Month:	38	
Per trip delivery VMT:	50	
Total monthly VMT:	1900	
Total annual VMT:	22800	
Fraction annual VMT (gas	0.5	
Fraction annual VMT (die:	0.5	Daily VMT*
Annual gasoline VMT:	11400	44
Annual diesel VMT:	11400	44

*Daily VMT based on 260 days/year.

Emissions Factors (lbs/vmt)

NOx	CO	VOC	SOx	PM10	CO2	
0.03422	0.009532	0.002411	0.00004	0.001556	4.04823	Diesel
0.00202	0.01296	0.001125	0.000015	0.000098	1.4488	MD Gas

Max Daily Emissions (lbs)

NOx	**CO**	**VOC**	**SOx**	**PM10**	**CO2**	**PM2.5**	
1.5004	0.4179	0.1057	0.0018	0.0682	177.4993	0.0676	Diesel
0.0886	0.5682	0.0493	0.0007	0.0043	63.5243	0.0043	MD Gas

Tons per Const Period

0.1951	0.0543	0.0137	0.0002	0.0089	23.0749	0.0088	Diesel
0.0115	0.0739	0.0064	0.0001	0.0006	8.2582	0.0006	MD Gas

Ref: MDAB, Emfac 2007, V2.3, Nov 2006
LDPs (gas and diesel), 1966-2010

HTF System Component Count and Fugitve Emissions Estimate
Mohave Solar Project

Component	Count #	Service	EF lb/hr/src	Hrs/day	lbs/hr	lbs/day	lbs/yr	tons/yr
Valves								
Sealed Bellows	0	Gas/Vapor & Lt. Liquid	0	0	0.000	0.000	0.000	0.000
AQMD Approved I&M	0	Fuel/N.Gas	0	0	0.000	0.000	0.000	0.000
	0	Gas Vapor	0	0	0.000	0.000	0.000	0.000
	3247	Lt. Liquid	0.0002517	16	0.817	13.076	4772.856	2.386
	0	Hvy. Liquid	0	0	0.000	0.000	0.000	0.000
Pumps								
Sealess Type	0	Lt. Liquid	0	0	0.000	0.000	0.000	0.000
Double Mech Seals or Equivalent	24	Lt. Liquid	0.0008448	16	0.020	0.324	118.407	0.059
Single Mech Seal	0	Hvy. Liquid	0	0	0.000	0.000	0.000	0.000
Compressors	0	Gas/Vapor	0	0	0.000	0.000	0.000	0.000
Flanges/Connectors	1550	All	0.0000165	16	0.026	0.409	149.358	0.075
PRVs	16	Gas	0.098546	8	1.577	12.614	4604.069	2.302
Process Drains	0	All	0	0	0.000	0.000	0.000	0.000
Open-ended Lines	0	Lt. Liquid	0.003307	0	0.000	0.000	0.000	0.000
				Totals	2.44	26.42	9644.69	4.82
Operating Days/Yr:	365							

Decomposition By Products:

Comment	CAS #	Substance ID	% wt of Total VOC	Fraction of VOC, wt	lbs/hr	lbs/day	lbs/yr	tons/yr
MSDS Trace Amount		Benzene	5	0.05	0.122	1.321	482.235	0.241
MSDS Trace Amount		Phenol	5	0.05	0.122	1.321	482.235	0.241
HTF Composition Value		Biphenyl	26.5	0.265	0.647	7.002	2555.843	1.278
			0	0	0.000	0.000	0.000	0.000
		***	0	0	0.000	0.000	0.000	0.000

Notes:
(1) VOC BACT for component system is I&M program. Leaks not to exceed 100 ppmv for all components.
(2) VOC BACT is accepted as achieved in practice.
(3) Ref: Kern County APCD, Engineering Analysis, Beacon Hill Solar Project, Project No. 090717, DOC 0369004A.
(4) CEC, FSA, Beacon Hill Solar, August 2009, 08-AFC-2, CEC-700-2009-005-FSA.
(5) Decomposition data from HTF manufacturer and related MSDS.
(6) All drains, vents, and inline relief valves are capped and they are included as "connectors".
(7) In line relief valves relieve light liquid from high pressure to successively lower pressures.
(8) The only relief valves to atmosphere are from Nitrogen blanketed vapor space (gas) on tanks and cleaning system.

Table C.5-7 Offsite Equipment and Manpower Schedules
Offsite Construction Vehicles

VEHICLE TYPE	HP	Fuel Type	Load Factor (%)	USAGE DESCRIPTION
Off-Site Flat Bed Trucks (From Rail Facility)	200	gasoline		Material Hauling
Off-Site Asphalt Trucks	200	diesel		Asphalt Hauling
Off-Site Concrete Trucks	310	diesel		Concrete Delivery
Off-Site Construction Worker Commute	180	gasoline		Personal vehicle (see commute table below)
Off-Site Dump Trucks	275	diesel		Material Hauling
Off-Site Low Boy Trucks (From Rail Facility)	250	diesel		Material Hauling
Off-Site Pickup Trucks	200	gasoline		Light duty material hauling
Off-Site Pipe Hauling Trucks (From Rail Facility)	250	diesel		Piping material hauling
Off-Site Water Trucks	250	diesel		Dust suppression water
Off-Site Fuel/Lube Trucks	200	gasoline		Mobile fuel & lubrication services
Off-Site HTF Delivery Trucks (From Rail Facility)	250	diesel		Delivery of HTF (transfer from rail yard)
Off-Site Box Van Trucks	200	diesel		Material Hauling (Small items / Dry Requirement Items)

Note: Use separate sheet (Site Construction Equipment) for on-site vehicles

Average Vehicle Miles Traveled per Day and Number of Vehicles

VEHICLE TYPE	Mi./ Veh.-Day*	Number M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26
Off-Site Flat Bed Trucks (From Rail Facility)	50	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	2	2
Off-Site Asphalt Trucks	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	2
Off-Site Concrete Trucks	50	1	12	46	46	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	46	46	46	37	14	4
Off-Site Dump Trucks	50	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Off-Site Low Boy Trucks (From Rail Facility)	50	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1
Off-Site Pickup Trucks	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
Off-Site Pipe Hauling Trucks (From Rail Facility)	50	0	0	0	0	0	0	0	0	0	3	4	5	5	5	5	5	5	5	4	2	0	0	0	0	0	0
Off-Site Water Trucks	50	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Off-Site Fuel/Lube Trucks	50	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Off-Site HTF Delivery Trucks (From Rail Facility)	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2	2	2	2	2	2
Off-Site Box Van Trucks	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	1	0

Daily Mileage Accumulation

VEHICLE TYPE	Mi./ Veh.-Day*	Vehicle-Miles-Traveled (mi/day) M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26
Off-Site Flat Bed Trucks (From Rail Facility)	50	50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	150	150	150	150	150	150	150	100	100
Off-Site Asphalt Trucks	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	150	150	150	100
Off-Site Concrete Trucks	50	50	600	2,300	2,300	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,750	2,300	2,300	2,300	1,850	700	200
Off-Site Dump Trucks	50	50	50	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Off-Site Low Boy Trucks (From Rail Facility)	50	50	50	50	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	50	50
Off-Site Pickup Trucks	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	50	50	50	50	0
Off-Site Pipe Hauling Trucks (From Rail Facility)	50	0	0	0	0	0	0	0	0	0	150	200	250	250	250	250	250	250	250	200	100	0	0	0	0	0	0
Off-Site Water Trucks	50	50	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Off-Site Fuel/Lube Trucks	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	0
Off-Site HTF Delivery Trucks (From Rail Facility)	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	100	100	100	100	100	100	100
Off-Site Box Van Trucks	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	50	0

	VMT		Const Period Delivery data diesel VMT	gasoline VMT
	62350	gasoline	**1429750**	**94600**
	15050	diesel		
	1266350	diesel		
	4300	diesel		
	50525	diesel		
	5375	gasoline		
	51600	diesel		
	3225	diesel		
	26875	gasoline		
	18275	diesel		
	20425	diesel		
Total	1524350			

Off-Site Construction Workers Bussing Adjustments

Total		**173**	**244**	**321**	**411**	**680**	**862**	**898**	**948**	**968**	**998**	**1086**	**1081**	**1127**	**1149**	**1144**	**1139**	**1162**	**1155**	**1130**	**1069**	**1051**	**946**	**885**	**607**	**217**	**138**		
Solar Collector Array Facility (included in Total)					10	150	298	298	298	298	298	298	298	298	298	298	298	298	298	298	298	298	298	298	150			5674	people
Supervisors/Management/Admin (included in Total)		8	24	35	45	65	75	75	75	75	85	85	85	85	85	85	85	85	80	75	75	75	55	55	55	30	15	1672	people
Final Off-Site Construction Worker Commute (people, not vehicles)		**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**	**M13**	**M14**	**M15**	**M16**	**M17**	**M18**	**M19**	**M20**	**M21**	**M22**	**M23**	**M24**	**M25**	**M26**		
Day Shift - non Bussed		49	79	107	137	219	247	256	269	274	285	307	306	317	323	322	320	326	322	314	299	294	260	244	175	77	46	6173	people
Day Shift - Bussed		124	165	215	275	461	575	602	640	655	668	734	730	765	781	777	774	791	790	776	731	717	657	612	403	140	92	14648	people
Evening Shift - non Bussed							25	25	25	25	28	28	28	28	28	28	28	28	26	25	25	25	18	18	18			479	people
Evening Shift - Bussed (if available)							15	15	15	15	17	17	17	17	17	17	17	17	16	15	15	15	11	11	11			290	people
check cells		TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE		
* Maximum One-way haul distance (backhaul not included since trucks are not dedicated to site or project)																													
Day shift non-bussed total worker vehicles assuming 20% carpool		39	63	85	109	175	198	205	215	219	228	246	245	254	258	257	256	261	258	251	239	235	208	195	140	61	37		
Day shift total buses (roundtrips)		3	3	4	6	10	12	13	13	14	14	15	15	16	16	16	16	16	16	16	15	15	14	13	8	3	2	Total	
Evening shift total worker vehicles assuming no bussing and 20% carpool		0	0	0	0	0	32	32	32	32	36	36	36	36	36	36	36	36	34	32	32	32	23	23	23	0	0	Trips	Total VMT
Total Vehicle Trips (non-bussed) per month		847	1359	1832	2348	3763	4932	5087	5302	5388	5680	6059	6037	6235	6330	6308	6287	6386	6274	6085	5822	5745	4967	4704	3509	1320	787	119390	7163370
Total Bussed Vehicles Trips per month		55	74	96	123	207	258	270	287	293	299	329	327	342	350	348	346	354	354	348	327	321	294	274	181	63	41	6561	393658

Max workers per month (assume pre day is same value):	1162	
Avg workers per month (assume pre day is same value):	830	
Assume all trips for worker commute are from Barstow:	60	miles roundtrip

(1) delivery trips from BNSF Barstow and urban area
(2) commute trips from Barstow urban area or commute staging area
(3) delivery trips only one way as non-dedicated to site
(4) commute trip distance is roundtrip
(5) assume bus capacity is 48 people
(6) assume evening shift is all non-bussed

Table C.5-6
Estimated Construction Equipment Identification and Use Rates

EQUIPMENT DESCRIPTION			HP	FUEL TYPE	USAGE DESCRIPTION	
SITE GRADING						
TRUCK	PICKUP	.5 TONS- 4 X 2	190	Gas	Grading Supervisors / Grade Checkers	(1) Superintendent or (1) Grade Checker
TRUCK	FUEL/LUBE	6 Tons - 4X2	223	Diesel	Fueling / Maintenance of Grading Equipment	(1) Mechanic's Helper
TRUCK	PICKUP	1.0 TONS- 4 X 4	190	Diesel	Grading Maintenance/Mechanics	(1) Mechanic and (1) Mechanic's Helper
14 M MOTOR GRADER	GRADING EQUIPMENT	47,133 LB	174	Diesel	Earth Moving	(1) Heavy Equipment Operator
623G SCRAPER	GRADING EQUIPMENT	23 CY	313	Diesel	Earth Moving	(1) Heavy Equipment Operator
657G SCRAPER	GRADING EQUIPMENT	44 CY	313	Diesel	Earth Moving	(1) Heavy Equipment Operator
825 H COMPACTOR	GRADING EQUIPMENT	72,164 LB	114	Diesel	Earth Moving	(1) Heavy Equipment Operator
631 WATER PULL (10K)	GRADING EQUIPMENT	10,000 GALLON	223	Diesel	Earth Moving	(1) Heavy Equipment Operator
D6 DOZERS	GRADING EQUIPMENT	44,418 LB	144	Diesel	Earth Moving	(1) Heavy Equipment Operator
414E INDUSTRIAL LOADER	GRADING EQUIPMENT	1 CY	89	Diesel	Site clean-up / Maintenance	(1) Heavy Equipment Operator
WATER TRUCK	GRADING EQUIPMENT	4,000 GALLON	223	Diesel	Site clean-up / Maintenance	(1) Heavy Equipment Operator
TRUCK	DUMP TRUCK	6 CY	223	Diesel	Site clean-up / Maintenance	(1) Heavy Equipment Operator
POWER BLOCK AND HTF AREA						
AUTO	CAR 4-DOOR	STANDARD	190	Gas	Administrative and personnel vehicle for site usage	
TRUCK	PICKUP	.5 TONS- 4 X 2	190	Gas	General construction usage vehicle	
TRUCK	PICKUP	.75 TONS- 4 X 2	190	Gas	General construction usage vehicle	
TRUCK	PICKUP	.75 TONS- 4 X 4	200	Diesel	General construction usage vehicle	
TRUCK	PICKUP - CREW CAB	.75 TONS- 4 X 4	200	Diesel	General construction usage vehicle	
TRUCK	PICKUP	1.0 TONS- 4 X 4	200	Diesel	General construction usage vehicle	
TRUCK	FLATBED	2 TONS- 4 X 2	200	Diesel	On-site material hauling	
TRUCK	FLATBED	6 TONS- 4 X 2	200	Diesel	On-site material hauling	
TRUCK	FLATBED	15 TONS- 4 X 2	200	Diesel	On-site material hauling	
TRUCK	FLATBED	30 TONS- 6 X 4	250	Diesel	On-site material hauling	
TRUCK	A-FRAME	4 X 4	200	Gas	On-site material hauling	
TRUCK	LUBE/GREASE		223	Diesel	Lube/grease truck for on-site construction vehicle maintenance	
TRUCK	CHERRY PICKER	NON-INSULATED	185	Diesel	Small crane for light duty lifting	
TRUCK	DUMP TRUCK	6 CY	223	Diesel	On-site material hauling	
TRUCK	DUMP TRUCK	12 CY	223	Diesel	On-site material hauling	
TRUCK	DUMP TRUCK	20 CY	223	Diesel	On-site material hauling	
TRACTOR	TRUCK TRACTOR	30 TONS 6X4	80	Diesel	Trailer pulling and general construction usage	
TRACTOR	TRUCK TRACTOR	60 TONS 6X4	80	Diesel	Trailer pulling and general construction usage	
TRACTOR	WHEEL, W/TOW HITCH	50 HP	80	Diesel	Trailer pulling and general construction usage	
CRANE	TELESCOPIC JIB, SELF	PROP. 5 TONS	185	Diesel	Small crane for light duty lifting	
CRANE	TELESCOPIC JIB, SELF	PROP. 10 TONS	185	Diesel	Small crane for light duty lifting	
CRANE	TELESCOPIC JIB, SELF	PROP. 15 TONS	185	Diesel	Small crane for light duty lifting	
CRANE	TELESCOPIC JIB	TRUCK - 20 TONS	191	Diesel	Small crane for medium duty lifting	
CRANE	TELESCOPIC JIB	TRUCK - 25 TONS	191	Diesel	Small crane for medium duty lifting	
CRANE	TELESCOPIC JIB	TRUCK - 30 TONS	191	Diesel	Small crane for medium duty lifting	
CRANE	TELESCOPIC JIB	TRUCK - 70 TONS	191	Diesel	Small crane for medium duty lifting	
CRANE	FIXED JIB, CRAWLER	20 TONS	191	Diesel	Small crane for medium duty lifting	
CRANE	FIXED JIB, CRAWLER	30 TONS	191	Diesel	Small crane for medium duty lifting	
CRANE	FIXED JIB, CRAWLER	40 TONS	191	Diesel	Small crane for medium duty lifting	
CRANE	FIXED JIB, CRAWLER	120 TONS	191	Diesel	Small crane for medium duty lifting	
CRANE	FIXED JIB, CRAWLER	165 TONS	250	Diesel	Large crane for heavy duty lifting	
CRANE	FIXED JIB, CRAWLER	400 TONS	350	Diesel	Large crane for heavy duty lifting	
PILING	DRILLING FRAME	AUGER	218	Diesel	Drilling machine for pier foundations	
PILING	DRILLING FRAME	AUGER	218	Diesel	Drilling machine for pier foundations	
COMPRESSOR	DIESEL(ROTARY SCREW)	250 CFM	37	Diesel	Air compressor for pneumatic construction tools and equipment	
COMPRESSOR	DIESEL(ROTARY SCREW)	365 CFM	37	Diesel	Air compressor for pneumatic construction tools and equipment	
COMPRESSOR	DIESEL(ROTARY SCREW)	600 CFM	37	Diesel	Air compressor for pneumatic construction tools and equipment	
CONCRETE	CONCRETE MIXER	6 SACK	223	Diesel	Concrete mixer for small foundations and supports	
CONCRETE	CONCRETE MIXER	16 SACK (1 CY)	223	Diesel	Concrete mixer for small foundations and supports	
CONCRETE	VIBRATOR GASOLINE	2.4 HP,2 IN HEAD	2.4	Gas	Small area compaction	
CONCRETE	POWER TROWEL,4 BLADE	36 IN DIA	5	Gas	Concrete finishing tool	
CONCRETE	SITE DUMPER	.75 CY, DIESEL	5	Diesel	On-site material hauling	
WELDING EQUIPMENT	PORTABLE DIESEL	300 AMPERES	25	Diesel	Welding equipment	
WELDING EQUIPMENT	PORTABLE DIESEL	400 AMPERES	25	Diesel	Welding equipment	
PIPING EQUIPMENT	CUTTING & BEVELLING	1 - 4 INCHES	10	Diesel	Pipe fitting and preparation	
PIPING EQUIPMENT	CUTTING & BEVELLING	6 - 20 INCHES	10	Diesel	Pipe fitting and preparation	
PIPING EQUIPMENT	CUTTING & BEVELLING	22 - 30 INCHES	15	Diesel	Pipe fitting and preparation	
PUMP	DIAPHRAGM	4 INCHES SUCTION	10	Gas	Small pump for sumps and general construction usage	
ELECTRIC EQUIP/TOOL	GENERATOR SET	10 KW	50	Gas	Small generator for construction tools	
ASPHALT EQUIPMENT	PAVER/FINISHER	10 FEET WIDE	100	Diesel	Pavement finishing	
ASPHALT EQUIPMENT	SPREADER TRAILER,GAS	2000 GAL, SPRAY	100	Gas	Pavement spreading	

ID #	Category for Main Sheet Calcs
1	Bore/Drill Rigs/Pile Drivers
2	Cement Mixers
3	Industrial/Concrete Saws
4	Cranes
5	Crawler Tractors/Dozers
6	Crushing/Processing Eq.
7	Dump and Tender Trucks
8	Excavators
9	Forklifts/Aerial Lifts/Booms
10	Generators/Compressors
11	Graders
12	Off Highway Tractors
13	Off Highway Trucks
14	Other Const. Eq.-Diesel
15	Pavers
16	Paving Eq./Surfacing Eq.
17	Plate Compactors
18	Rollers/Compactors
19	Rough Terrain Forklifts
20	Rubber Tired Dozers
21	Rubber Tired Loaders
22	Scrapers
23	Signal Boards/Light Sets
24	Skid Steer Loaders
25	Tractors/Loaders/Backhoes
26	Trenchers
27	Welders
28	Other Const. Eq.-Gasoline

SOLAR FIELD					
AUTO	CAR 4-DOOR	STANDARD	190	Gas	Administrative and personnel vehicle for site usage
TRUCK	PICKUP	.75 TONS- 4 X 2	190	Gas	General construction usage vehicle
TRUCK	PICKUP	.75 TONS- 4 X 4	200	Diesel	General construction usage vehicle
TRUCK	PICKUP - CREW CAB	.75 TONS- 4 X 4	200	Diesel	General construction usage vehicle
TRUCK	FLATBED	2 TONS- 4 X 2	200	Gas	On-site material hauling
TRUCK	FLATBED	6 TONS- 4 X 2	200	Diesel	On-site material hauling
TRUCK	FLATBED	15 TONS- 4 X 2	200	Diesel	On-site material hauling
TRUCK	A-FRAME	4 X 4	200	Gas	On-site material hauling
TRUCK	CHERRY PICKER	NON-INSULATED	185	Diesel	Small crane for light duty lifting
TRUCK	DUMP TRUCK	6 CY	223	Diesel	On-site material hauling
TRUCK	DUMP TRUCK	12 CY	223	Diesel	On-site material hauling
TRUCK	DUMP TRUCK	20 CY	223	Diesel	On-site material hauling
TRACTOR	TRUCK TRACTOR	30 TONS 6X4	80	Diesel	Trailer pulling and general construction usage
TRACTOR	TRUCK TRACTOR	60 TONS 6X4	80	Diesel	Trailer pulling and general construction usage
TRACTOR	WHEEL, W/TOW HITCH	50 HP	80	Diesel	Trailer pulling and general construction usage
CRANE	TELESCOPIC JIB, SELF	PROP. 15 TONS	185	Diesel	Small crane for light duty lifting
CRANE	TELESCOPIC JIB	TRUCK - 20 TONS	191	Diesel	Small crane for medium duty lifting
CRANE	TELESCOPIC JIB	TRUCK - 25 TONS	191	Diesel	Small crane for medium duty lifting
CRANE	TELESCOPIC JIB	TRUCK - 50 TONS	191	Diesel	Small crane for medium duty lifting
CRANE	FIXED JIB	TRUCK - 60 TONS	191	Diesel	Small crane for medium duty lifting
CRANE	FIXED JIB, CRAWLER	20 TONS	191	Diesel	Small crane for medium duty lifting
COMPRESSOR	DIESEL(ROTARY SCREW)	250 CFM	80	Diesel	Air compressor for pneumatic construction tools and equipment
COMPRESSOR	DIESEL(ROTARY SCREW)	365 CFM	80	Diesel	Air compressor for pneumatic construction tools and equipment
COMPRESSOR	DIESEL(ROTARY SCREW)	600 CFM	80	Diesel	Air compressor for pneumatic construction tools and equipment
CONCRETE	CONCRETE MIXER	6 SACK	223	Diesel	Concrete mixer for small foundations and supports
CONCRETE	CONCRETE MIXER	16 SACK (1 CY)	223	Diesel	Concrete mixer for small foundations and supports
CONCRETE	VIBRATOR GASOLINE	2.4 HP,2 IN HEAD	2.4	Gas	Small area compaction
CONCRETE	POWER TROWEL,4 BLADE	36 IN DIA	5	Gas	Concrete finishing tool
CONCRETE	SITE DUMPER	.75 CY, DIESEL	5	Diesel	On-site material hauling
WELDING EQUIPMENT	PORTABLE GASOLINE	200 AMPERES	25	Gas	Welding equipment
WELDING EQUIPMENT	PORTABLE DIESEL	400 AMPERES	25	Diesel	Welding equipment
PIPING EQUIPMENT	CUTTING & BEVELLING	6 - 20 INCHES	10	Diesel	Pipe fitting and preparation
PUMP	DIAPHRAGM	4 INCHES SUCTION	10	Gas	Small pump for sumps and general construction usage
ELECTRIC EQUIP/TOOL	GENERATOR SET	10 KW	50	Gas	Small generator for construction tools
ASPHALT EQUIPMENT	PAVER/FINISHER	10 FEET WIDE	100	Diesel	Pavement finishing

Equipment Usage On-Site by Month

EQUIPMENT DESCRIPTION			Hours/Day*	Number Used Each Month														
				M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
SITE GRADING																		
TRUCK	PICKUP	.5 TONS- 4 X 2	10	6	6	6	6	6	6									
TRUCK	FUEL/LUBE	6 Tons - 4X2	10	4	4	4	4	4	4									
TRUCK	PICKUP	1.0 TONS- 4 X 4	10	3	3	3	3	3	3									
14 M MOTOR GRADER	GRADING EQUIPMENT	47,133 LB	10	6	6	6	6	6	6									
623G SCRAPER	GRADING EQUIPMENT	23 CY	10	32	32	32	32	32	32									
657G SCRAPER	GRADING EQUIPMENT	44 CY	10	5	5	5	5	5	5									
825 H COMPACTOR	GRADING EQUIPMENT	72,164 LB	10	3	3	3	3	3	3									
631 WATER PULL (10K)	GRADING EQUIPMENT	10,000 GALLON	10	6	6	6	6	6	6									
D6 DOZERS	GRADING EQUIPMENT	44,418 LB	10	3	3	3	3	3	3									
414E INDUSTRIAL LOADER	GRADING EQUIPMENT	1 CY	10							1	1	1	1	1	1	1	1	1
WATER TRUCK	GRADING EQUIPMENT	4,000 GALLON	10							1	1	1	1	1	1	1	1	1
TRUCK	DUMP TRUCK	6 CY	10							1	1	1	1	1	1	1	1	1
Monthly Equipment Onsite,#				**68**	**68**	**68**	**68**	**68**	**68**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
POWER BLOCK & HTF AREA																		

AUTO	CAR 4-DOOR	STANDARD	10					1	1	1	1	1	1	1	1	2	2	2
TRUCK	PICKUP	.5 TONS- 4 X 2	10					1	1	1	1	1						
TRUCK	PICKUP	.75 TONS- 4 X 2	10								1	2	4	6	8	10	12	12
TRUCK	PICKUP	.75 TONS- 4 X 4	10					2	2	4	6	8	12	12	12	12	12	12
TRUCK	PICKUP - CREW CAB	.75 TONS- 4 X 4	10															
TRUCK	PICKUP	1.0 TONS- 4 X 4	10								1	1	1	1	1	1	1	1
TRUCK	FLATBED	2 TONS- 4 X 2	10								1	1	1	1	1	1	1	1
TRUCK	FLATBED	6 TONS- 4 X 2	10							1	1	1	1	1	1	1	1	1
TRUCK	FLATBED	15 TONS- 4 X 2	10															1
TRUCK	FLATBED	30 TONS- 6 X 4	10															
TRUCK	A-FRAME	4 X 4	10					2	4	4	4	4	4	4	4	4	4	4
TRUCK	LUBE/GREASE		10															
TRUCK	CHERRY PICKER	NON-INSULATED	10															
TRUCK	DUMP TRUCK	6 CY	10															
TRUCK	DUMP TRUCK	12 CY	10											1	1	1	1	1
TRUCK	DUMP TRUCK	20 CY	10							1	1	1	1	1				
TRACTOR	TRUCK TRACTOR	30 TONS 6X4	10					1	1	1								
TRACTOR	TRUCK TRACTOR	60 TONS 6X4	10							1	1	1						
TRACTOR	WHEEL, W/TOW HITCH	50 HP	10					3	4	6	6	6	6	8	8	8	8	8
CRANE	TELESCOPIC JIB, SELF	PROP. 5 TONS	10							1	1	1	1	1				
CRANE	TELESCOPIC JIB, SELF	PROP. 10 TONS	10												1	1	1	1
CRANE	TELESCOPIC JIB, SELF	PROP. 15 TONS	10					1	1	3	4	6	6	8	8	8	8	8
CRANE	TELESCOPIC JIB	TRUCK - 20 TONS	10						2	4	6	8	8	8	8	8	8	8
CRANE	TELESCOPIC JIB	TRUCK - 25 TONS	10				2	2	2	2	2	2	2	2	2	2	2	2
CRANE	TELESCOPIC JIB	TRUCK - 30 TONS	10				1											
CRANE	TELESCOPIC JIB	TRUCK - 70 TONS	10					1	1	1	1	2	2	2	2	2	2	2
CRANE	FIXED JIB, CRAWLER	20 TONS	10															
CRANE	FIXED JIB, CRAWLER	30 TONS	10															
CRANE	FIXED JIB, CRAWLER	40 TONS	10															
CRANE	FIXED JIB, CRAWLER	120 TONS	10															
CRANE	FIXED JIB, CRAWLER	165 TONS	10															
CRANE	FIXED JIB, CRAWLER	400 TONS	10															
PILING	DRILLING FRAME	AUGER	10				1											
PILING	DRILLING FRAME	AUGER	10					1	1	1								
COMPRESSOR	DIESEL(ROTARY SCREW)	250 CFM	10					1										
COMPRESSOR	DIESEL(ROTARY SCREW)	365 CFM	10					1	1	1	1	1	1	1	1	1	1	1
COMPRESSOR	DIESEL(ROTARY SCREW)	600 CFM	10							1	1	2	2	2	2	4	4	4
CONCRETE	CONCRETE MIXER	6 SACK	10				1											
CONCRETE	CONCRETE MIXER	16 SACK (1 CY)	10				2	4	4	4	4	4	4	4	4	4	4	4
CONCRETE	VIBRATOR GASOLINE	2.4 HP,2 IN HEAD	10					1	1	1								
CONCRETE	POWER TROWEL,4 BLADE	36 IN DIA	10					1	2	2	2	2	2	1	1	1	1	1
CONCRETE	SITE DUMPER	.75 CY, DIESEL	10					1	1	1	1	1	1	1	1	1	1	1
WELDING EQUIPMENT	PORTABLE DIESEL	300 AMPERES	10						1									
WELDING EQUIPMENT	PORTABLE DIESEL	400 AMPERES	10					2	8	20	20	20	22	22	22	22	22	22
PIPING EQUIPMENT	CUTTING & BEVELLING	1 - 4 INCHES	10															
PIPING EQUIPMENT	CUTTING & BEVELLING	6 - 20 INCHES	10															1
PIPING EQUIPMENT	CUTTING & BEVELLING	22 - 30 INCHES	10						1	1	1	1	1	1	1	1	1	1
PUMP	DIAPHRAGM	4 INCHES SUCTION	10				1	1	1	1	1	1	1	1	1	1	1	1
ELECTRIC EQUIP/TOOL	GENERATOR SET	10 KW	10			1	1	1	1	1	1	1	1	1	1	1	1	1
ASPHALT EQUIPMENT	PAVER/FINISHER	10 FEET WIDE	10															
ASPHALT EQUIPMENT	SPREADER TRAILER,GAS	2000 GAL, SPRAY	10															
	Monthly Equipment Onsite,#			**0**	**0**	**1**	**9**	**28**	**41**	**65**	**70**	**79**	**85**	**91**	**92**	**97**	**99**	**101**

SOLAR FIELD			Hours/Day*															
AUTO	CAR 4-DOOR	STANDARD	20	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2
TRUCK	PICKUP	.75 TONS- 4 X 2	20	3	5	5	7	10	10	10	10	10	10	10	10	10	10	10
TRUCK	PICKUP	.75 TONS- 4 X 4	20		5	5	10	10	10	10	10	10	10	10	10	10	10	10
TRUCK	PICKUP - CREW CAB	.75 TONS- 4 X 4	20											1	1	1	1	1
TRUCK	FLATBED	2 TONS- 4 X 2	20															
TRUCK	FLATBED	6 TONS- 4 X 2	20		1	1	1	1	1	1	1	1	1	1	1	1	1	2
TRUCK	FLATBED	15 TONS- 4 X 2	20															
TRUCK	A-FRAME	4 X 4	20	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4
TRUCK	CHERRY PICKER	NON-INSULATED	20	1														
TRUCK	DUMP TRUCK	6 CY	20	1	1	1	1	1	1	1								
TRUCK	DUMP TRUCK	12 CY	20	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2
TRUCK	DUMP TRUCK	20 CY	20			1	1	1										
TRACTOR	TRUCK TRACTOR	30 TONS 6X4	20															
TRACTOR	TRUCK TRACTOR	60 TONS 6X4	20															
TRACTOR	WHEEL, W/TOW HITCH	50 HP	20		4	8	12	16	16	16	16	16	16	16	16	16	16	16
CRANE	TELESCOPIC JIB, SELF	PROP. 15 TONS	20	2	2	2	2	2	4	4	6	8	8	8	8	8	8	8
CRANE	TELESCOPIC JIB	TRUCK - 20 TONS	20	2	4	5	5	10	10	10	10	10	10	10	10	10	10	10
CRANE	TELESCOPIC JIB	TRUCK - 25 TONS	20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CRANE	TELESCOPIC JIB	TRUCK - 50 TONS	20															
CRANE	FIXED JIB	TRUCK - 60 TONS	20															
CRANE	FIXED JIB, CRAWLER	20 TONS	20	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3
COMPRESSOR	DIESEL(ROTARY SCREW)	250 CFM	20		1	1	1											
COMPRESSOR	DIESEL(ROTARY SCREW)	365 CFM	20	2	2	2	4	5	5	5	5	5	5	5	5	5	5	5
COMPRESSOR	DIESEL(ROTARY SCREW)	600 CFM	20									1	1	1	1	2	2	3
CONCRETE	CONCRETE MIXER	6 SACK	20	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1
CONCRETE	CONCRETE MIXER	16 SACK (1 CY)	20	1	1	1	2	2	2	2	2	2	2	2	2	2	1	1
CONCRETE	VIBRATOR GASOLINE	2.4 HP,2 IN HEAD	20			1	1	1	1	1	1	1						
CONCRETE	POWER TROWEL,4 BLADE	36 IN DIA	20			1	1	1	1	1	1	1	1	1				
CONCRETE	SITE DUMPER	.75 CY, DIESEL	20	1	1	1	1	1	1	1	1	1	1	1	1	1		
WELDING EQUIPMENT	PORTABLE GASOLINE	200 AMPERES	20															
WELDING EQUIPMENT	PORTABLE DIESEL	400 AMPERES	20			10	25	25	25	25	25	25	25	25	25	25	25	25
PIPING EQUIPMENT	CUTTING & BEVELLING	6 - 20 INCHES	20										1	1	1	1	1	1
PUMP	DIAPHRAGM	4 INCHES SUCTION	20	1	1	1	1	1	1	1	1	1						
ELECTRIC EQUIP/TOOL	GENERATOR SET	10 KW	20						1	1	1	1						
ASPHALT EQUIPMENT	PAVER/FINISHER	10 FEET WIDE	20															
		Monthly Equipment Onsite,#		**21**	**35**	**55**	**84**	**96**	**99**	**99**	**101**	**104**	**102**	**104**	**103**	**105**	**103**	**105**
		Total Monthly Equipment Onsite All Phases: #		**89**	**103**	**124**	**161**	**192**	**208**	**167**	**174**	**186**	**190**	**198**	**198**	**205**	**205**	**209**

Avg to Max EQ Use Rates by Phase

	monthly avg # of EQ on site	monthly max # of EQ on site	ratio max/avg
Site grading/prep phase 1	68	68	1.00
Site grading/prep phase 2	3	3	1.00
Power block/HTF area phase	68	101	1.48
Solar field phase	89.5	107	1.20

Notes:
HP values are equipment category averages per Applicant or Sacramento County per Table C.5-5.

M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	Total Hp-Hrs	Eq Cat ID
											1470600	28
											1150680	14
											735300	14
											1346760	11
											12920640	11
											2018850	11
											441180	11
											1726020	11
											557280	11
1	1	1	1	1	1	1	1	1	1	1	382700	11
1	1	1	1	1	1	1	1	1	1	1	958900	11
1	1	1	1	1	1	1	1	1	1	1	958900	7
3	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**24667810**	

2	2	2	2	2	2	2	1	1	1	1	1307200	28
											204250	28
12	12	12	12	10	10	8	8	6	4	3	6209200	28
12	12	12	12	12	12	8	8	8	5	4	8557000	14
		1	1	1	1	1	1	1	1		344000	14
1	1	1	1	1	1	1					645000	14
1	1	1	1	1	1	1	1				688000	14
1	1	1	1								559000	14
1	1	1	1	1							258000	13
							1				53750	13
4	4	4	4	4	4	4	4	4	3	2	3569000	28
		1									47945	7
					1	1	1	1			159100	9
			1	1	1	1	1	1			287670	7
1	1	1									383560	7
											239725	7
											51600	12
											51600	12
8	8	8	8	8	6	6	6	4	3	2	2373600	12
											198875	9
1											198875	9
8	8	8	8	8	8	8	8	7	4	4	5568500	9
8	8	8	8	8	8	8	8	8	6	4	6159750	4
2	2	2	2	2	2	2	2	2	2	2	1888990	4
											41065	4
2	1	1	1	1	1	1	1	1	1	1	1231950	4
1	1	1	1	1	1	1	1	1	1	1	451715	4
							1	1	1		123195	4
							1				41065	4
								1			41065	4
			1	1	1						161250	4
								1			75250	4
											46870	1
											140610	1
											7955	10
1	1	1	2	2	2	2	1	1	1	1	206830	10
4	4	4	4	4	4	4	2	2	2	2	461390	10
											47945	2
2	2										2397250	2
											1548	2
1	1	1									20425	2
1	1										13975	2
											5375	27
22	22	22	22	22	22	22	20	20	20	10	2289750	27
					1	1	1				6450	14
1	1	1	1	1	1	1	1	1	1		23650	14
1	1	1	1	1	1	1	1	1			61275	14
1	1	1	1								34400	28
1	1	1	1	1	1	1	1	1	1	1	258000	28
										1	21500	15
										1	21500	28
100	**98**	**97**	**97**	**93**	**92**	**85**	**81**	**74**	**57**	**40**	**48237443**	

2	2	2	2	2	2	2	2	2	2	1	3349700	28
10	10	10	10	10	10	10	10	8	8	4	18791000	28
10	10	10	10	10	10	10	10	10	10	7	20382000	14
1	1	1	1	1	1	1	1	1	1	1	1376000	14
1	1	1	1	1	1	1	1	1	1		860000	28
2	2	2	2	2	2	2	2	2	2	1	3096000	14
					1	1					172000	14
4	4	4	4	4	4	4	4	4	3	2	8342000	28
											79550	9
											671230	7
2	2	2	2	1	1	1	1	1	1	1	3356150	7
											287670	7
						1					34400	12
							1				34400	12
16	16	16	16	16	16	16	13	12	12	6	12212000	12
8	8	8	8	8	8	8	6	6	4	3	12330250	9
10	10	10	10	10	10	10	8	8	3	1	17740080	9
1	1	1	1	1	1	1	1	1	1	1	2135380	9
					1	1	1	1	1		410650	9
							1				82130	9
3	3	3	3	3	3	3	3	3	3	2	4763540	9
											103200	10
6	6	6	6	6	6	6	6	6	4	2	4300000	10
3	3	3	3	2	2	2	2	1	1	1	1169600	10
1											2013690	2
1											2493140	2
											7224	17
											19350	17
											27950	7
					1						10750	27
25	20	20	20	20	20	20	20	20	19	10	5633000	27
1	1	1	1	1	1	1	1	1	1		68800	14
											38700	28
											86000	28
									1	1	86000	15
107	**100**	**100**	**100**	**98**	**101**	**101**	**94**	**88**	**78**	**44**	**126563534**	
210	**201**	**200**	**200**	**194**	**196**	**189**	**178**	**165**	**138**	**87**	**199468787**	Total

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
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APPLICATION FOR CERTIFICATION FOR THE *ABENGOA MOJAVE SOLAR POWER PLANT*

Docket No. 09-AFC-5

PROOF OF SERVICE
(Revised 1/11/2010)

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STATE OF CALIFORNIA

Energy Resources Conservation
and Development Commission

Application for Certification for the ***ABENGOA MOJAVE SOLAR POWER PLANT***	)	Docket No. 09-AFC-5

PROOF OF SERVICE

I, Karen A. Mitchell, declare that on January 11, 2010, I served the attached *Supplemental Responses to CEC Data Requests, Set 1A – Air Quality and Public Health* via electronic mail and United States Mail to all parties on the attached service list.

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

Karen A. Mitchell