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REVISED PETITION TO AMEND THE COMMISSION'S CERTIFICATION OF THE ABENGOA MOJAVE SOLAR PROJECT

09-AFC-5C

October 29, 2013

Abengoa Mojave Solar Project
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1. INTRODUCTION AND OVERVIEW OF PROPOSED AMENDMENT

Pursuant to Section 1769 of the Commission's Siting Regulations,[1] Mojave Solar LLC ("MSLLC") hereby submits to the California Energy Commission ("Commission" or "CEC") this petition for modification ("Petition") of the certification for the Abengoa Mojave Solar Project ("MSP" or "Project") (09-AFC-5, approved September 8, 2010), hereinafter "Final Decision."[2] MSLLC is proposing changes to the project description of the MSP, which will require corresponding modifications to certain conditions of certification contained in the Final Decision.[3] The overall potential emissions from the MSP analyzed in the Final Decision will decrease as a result of the proposed modifications to the project description.[4] Moreover, the proposed modifications will not result in any other adverse environmental impacts or risks to public health. In summary, the proposed project description changes are as follows:

- Modifications to the MSP Project Description
    - Modifications to the general arrangement of the Alpha and Beta power blocks;
    - Remove the existing low boilers and high boilers cleaning distillation VOC control system and install a scrubbing and carbon adsorption VOC control system;
    - Update the facility component counts with revision to the fugitive emissions inventory;
    - Replace the currently permitted two (2) Tier II 4,190 hp[5] (3,125 kW) emergency generators with two (2) Tier II 2280 kW units;
    - Reduce the currently permitted Tier II emergency generators' stack height to 30 feet above ground level (AGL);
    - Replace the currently permitted two (2) 346 hp Tier III fire pump engines with two (2) larger 575-617 hp Tier III engines; and
    - Remove the operational testing restriction of one (1) emergency engine per hour with the simultaneous testing of all emergency equipment.

[1] 20 C.C.R. § 1769.
[2] Abengoa Mojave Solar Project Commission Decision, Doc. No. 09-AFC-5, CEC-800-2010-008-CMF, Sept. 2010.
[3] The proposed changes are summarized in Attachment 1 to this Petition.
[4] As will be explained in further detail below, the level of volatile organic compounds ("VOC") estimated for the MSP differed between CEC Staff and the MDAQMD. Thus, there is a decrease for individual emissions components in terms of VOC levels as analyzed by CEC Staff and discussed in the Final Decision, but an increase in the amount considered by the MDAQMD FDOC. Additionally, due to the design changes, emissions of some pollutants increase while others decrease from pieces of equipment; however, the overall emissions decrease when compared to the analysis in the Final Decision (See Tables 4 and 5, vs. 7).
[5] Please note, the language in the Final Decision contained a typographical error, and described the emergency generator engines as "190 hp diesel fueled" and "4190 hp" rather than "4160 hp."

MSLLC has also filed for a revised Authority to Construct with the Mojave Desert Air Quality Management District ("MDAQMD") to reflect these project modifications. A copy of the application and materials provided to the MDAQMD is provided as Appendix 1 to this Petition.

This Petition also requests deletion of Air Quality conditions of certification AQ-1 through AQ-8, which are conditions contained in the MDAQMD's Final Determination of Compliance applicable to the MSP's natural gas fired auxiliary boilers. On July 24, 2013, MSLLC requested Commission Staff approval of a petition to amend the project description of the MSP to remove the natural gas fired auxiliary boilers ("July 24th Petition").[6] Assuming that the July 24th Petition is approved, as an administrative matter, AQ-1 through AQ-8 should be deleted as no longer applicable to the MSP.

In support of this Petition, MSLLC has reviewed revisions to the emission inventories, Best Available Control Technology ("BACT") analyses, and potential changes to air quality and public health impact assessments. As discussed below, this review supports the conclusion that the proposed modifications to the project description and corresponding conditions of certification will not result in any significant environmental impacts, and the MSP will continue to comply with applicable laws, ordinances, regulations, and standards ("LORS").

2. DESCRIPTION OF PROPOSED MODIFICATIONS

Section 1769(a)(1)(A) of the Commission's regulations requires a complete description of the proposed modification, including new language for any conditions that will be affected.

This Petition proposes modification of the project design of the MSP. As authorized by the Final Decision, the original design for the MSP contemplated the following:

- Two 21.5 MMBTU natural gas-fueled auxiliary HTF heaters, one per plant, used to maintain the temperature of the HTF above freezing during cold months and pre-warming for daily startup year-round;[7]
- Two 6-cell wet-cooling towers, one per plant, each to provide cooling and heat rejection from a single plant process;
- Two 346-hp diesel-fired emergency fire water pump engines, one per plant;
- Two Tier II 4,190 hp (3,125 kW) diesel engine-driven emergency generators, one per plant;
- One 2,000 gallon gasoline tank and one 2,000 gallon diesel tank that would refuel onsite dedicated vehicles for both plants;

[6] The July 24th Petition is available at: http://docketpublic.energy.ca.gov/PublicDocuments/09-AFC-05C/TN200039_20130725T115807_Petition_to_Amend_the_Commission%E2%80%99s_Certification_of_the_Abengoa.PDF

[7] Removal of the two natural gas-fueled auxiliary HTF heaters from the project design of the MSP is the subject of the July 24th Petition referenced above.

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

The emissions estimates for operation of the MSP, as calculated in the Supplemental Staff Assessment for the MSP and incorporated into the evidentiary record for the Final Decision and the MDAQMD Final Determination of Compliance ("FDOC") are set forth below in Table 1.

Table 1 CEC SSA and MDAQMD FDOC Project Emissions Estimates

Parameter	**NOx**	**CO**	**VOC**	**SOx**	**$PM_{10/2.5}$**
CEC Lbs/day	57.97	43	80.24	0.64	79.72
CEC Tons/yr	2.96	2.08	12.92	0.03	13.47
AQMD Lbs/day	52	57	22	1	116
AQMD Tons/yr	2.4	2.0	2.2	0.03	13.5

Ref: CEC Supplemental Staff Assessment (CEC-700-2010-003, May 2010, Air Quality Table 9); MDAQMD FDOC, Rev A, July 2010, Tables 1 and 2. Values do not include maintenance vehicle or fugitive dust emissions.

The primary reason for the differences in the CEC emissions estimates, as compared to the MDAQMD estimates, is that the CEC evaluated all emissions sources, while the MDAQMD considered only the sources subject to its permitting jurisdiction in calculating the emissions estimates.

This Petition proposes to modify the project design described above as follows.

- *Update the Alpha and Beta Power Blocks general arrangements, as a result of detailed engineering, to incorporate changes to equipment and building/process area locations.*

The Alpha and Beta Blocks general arrangements proposed in this Petition are provided as Attachment 3.

- *Remove the existing low boilers and high boilers cleaning distillation VOC control system and utilize a scrubbing and carbon adsorption VOC control system.*[8]

- *Update the two (2) vertical HTF storage tanks' condensers on the vent stacks with a scrubber on the vent stream for each plant.*

The Final Decision authorizes use of an HTF Expansion Vessel/Ullage Vent System consisting primarily of nitrogen-blanketed expansion and storage tanks, a Low Boiler and High Boiler cleaning system (distillation), with the use of cooling condensers on the tank vent stacks. This system has an overall VOC control/recovery efficiency of 99%. As proposed in this Petition, the primary change to the Ullage System will be the removal of the distillation system for the control of VOC emissions, and replacing it with a scrubber and carbon bed adsorption system. With the use of scrubbing and carbon adsorption, the vent coolers from the HTF Overflow Tanks are no longer necessary. The proposed modifications to the ullage system are summarized in the following table:

	Existing Permitted Equipment (each plant)	**Proposed Changes**
1	Five Vertical ASME-rated expansion vessels	Four vertical ASME expansion vessels based on reduced HTF capacity, with a Nitrogen Ullage Cooler on the expansion vessel vent stack before the scrubber
2	One horizontal nitrogen-condensing ASME-rated vessel	Rename Nitrogen Condensing Receiver to Low Boiler Condensate Receiver Vessel
3	Two vertical HTF storage/overflow tanks with cooling condensers on vent stacks	Replace cooling condensers with a scrubber
4	HTF Circulation Pumps	Same as originally proposed
5	Low Boilers and High Boilers cleaning system (distillation)	Two vent scrubbers and carbon adsorption system
6	The HTF storage/overflow tanks have a liquid HTF air cooler to maintain temperature	Replace liquid HTF air cooler with water-cooled liquid HTF cooler
7	All associated valves, flanges/connectors, pump seals and pressure relief valves	Updated component count
8	All associated temperature monitoring devices	Same as originally proposed

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

[8] Attachment 2 is the process flow block diagram for the modified ullage system with the newly proposed carbon adsorption system and estimated component counts.

Adsorption of the hydrocarbon molecules proceeds until the available surface area of the carbon is filled or saturated with the hydrocarbon molecules. The exhausted carbon bed is sent offsite for regeneration or disposal. Thus, the Project proposes to operate a carbon adsorption system where the residual uncondensed HTF, benzene and phenol along with nitrogen will pass through carbon beds (horizontal vessels). Activated carbon will capture the uncondensed HTF and low boilers like benzene and phenol which are products of HTF degradation.

The re-design of the system to incorporate the carbon adsorption system will maintain an overall VOC control efficiency rated at 99% recovery as assumed in the Final Decision.

- *Update the facility component counts with revision to the fugitive emissions inventory.*

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

Table 2 Emissions Summary for Proposed Modified Ullage System

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

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

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

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

Table 3 Air Toxic Emissions Estimates for Ullage System and HTF Fugitives(Facility total-2 plants)

Pollutant	HTF Overflow and Expansion Venting Emissions			HTF Fugitive Emissions	
	lbs/day Nominal	lbs/day Maximum	lbs/yr	lbs/day	lbs/yr
Diphenyl ether	0.68	1.36	248.2	4.52	9036.83
Biphenyl	0.26	0.52	94.9	13.81	3343.63
Benzene	2.78	5.56	1014.7	14.12	3415.92
Toluene	0.10	0.20	36.5	1.27	307.25
Phenol	0.48	0.96	175.2	5.90	1427.82
Dibenzofuran (High Boilers)	0.04	0.08	14.6	2.32	560.28

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

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

It should be noted that VOC fugitive emissions, as noted in the table above represent a decrease as compared to the emissions estimated in the CEC AFC Data Request Set 1A responses.

Previously calculated VOC venting and fugitive emissions per plant, were on the order of:

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

Attachment 2 contains the revised HTF Ullage System process flow block diagram.

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

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

- *Use of four (4) vertical ASME-rated expansion vessels (based on a reduction of HTF quantity) per plant, instead of five.*

The Final Decision for the MSP authorizes five vertical ASME-rated expansion vessels. Due to the reduced HTF capacity, new information from the final design engineering phase indicates that only four vertical ASME expansion vessels are needed instead of five.

- *Replace the two (2) Tier II 4,190 hp (3,125 kW) emergency generators with two (2) Tier II 2280 kW units.*

The currently permitted Tier II emergency generator engines are rated at approximately 4,190 hp (3,125 kW), firing diesel fuel. The original proposal was to use a Caterpillar 3516C-HD (or equivalent) generator set engines meeting the Tier II standards. MSLLC is now proposing to use a German built engine (MTU Friedrichshafen), rated at approximately 2,280 kW (~3057 bhp), and meeting the Tier II standards. As described in Table 4 below, this change in engine model/manufacturer results in slight changes to emissions as previously estimated.

Table 4 EGS Engine Emissions Comparison

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

*Emissions shown for 60 minutes per test. Actual testing (as reflected in the modeling) will be each of these engines run for a maximum of 30 minutes in any given test hour and per test day.
52 hrs/yr/engine
(1)VOC derived by using CARB protocol to split combined NOx+NMHC factor.
Emissions in Figure 1 are based on NOx+NMHC as total NOx for modeling purposes.

The use of Tier II engines represents current BACT, and the original BACT determination is still valid. Attachment 4 contains the new emergency generator set (EGS) engine specification sheet.

- *Reduce the minimum Tier II emergency generators stack height to 30 feet above ground level (AGL).*

- *Remove the operational testing restriction of one (1) emergency engine per hour with the simultaneous testing of all emergency equipment.*

As discussed in section 6, the air quality modeling shows that all engines can be tested simultaneously and the height of the emergency generator stacks can be reduced to 30 feet above grade level (fire pump stacks remain unchanged at 20 feet above grade level).

- *Replace the two (2) 346 hp Tier III fire pump engines with two (2) larger 575-617 hp Tier III engines.*

MSLLC is proposing to use fire pump engines that are substantially larger, i.e., hp rating, than the engines currently proposed. The current proposed engines are rated at 346 bhp, while the new proposed engines would be rated at 575-617 bhp (firing diesel fuel). The new engines, like the previous engines, are EPA Tier III compliant units. The new engines will have 6 cylinders, similar to the previously proposed engines, but due to the larger bhp rating, each unit will consume fuel at a rate of 29.2 gal/hr. No changes in operational or testing and maintenance hours are proposed. This proposed change will result in slight emissions increases and decreases on a pollutant-by-pollutant basis as shown in Table 5.

Table 5 Fire Pump Engine Emissions Comparison

Pollutant	Current Engines (each)				Proposed New Engines (each)			
	g/bhp-hr	Lbs/hr*	Lbs/day	TPY	g/bhp-hr	Lbs/hr	Lbs/day	TPY
NO_x	2.8	2.14	2.14	0.055	2.64	3.55	3.55	0.092
CO	2.6	1.98	1.98	0.052	0.6	0.811	0.811	0.021
VOC	0.2	0.15	0.15	0.004	0.151	0.203	0.203	0.005
SO_x	0.002	0.002	0.002	0.00005	-	0.0060	0.0060	0.0002
PM10/2.5	0.15	0.11	0.11	0.003	0.09	0.122	0.122	0.003

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

The emissions and modeling for the proposed changes are based on the largest engine in the category, i.e., 617 bhp (UFAD88). Any of the engines in the classes UFADN0, UFADP0, and UFAD88 are suitable for use for the facility fire pump systems. A smaller engine, i.e., 542-575 bhp models, might actually be utilized. Use of Tier III engines represents current BACT, and the original BACT determination is still considered valid. Attachment 5 contains the new fire pump engine specification sheets.

This Petition also proposes modifications to the conditions of certification for the MSP. As stated above, Air Quality conditions of certification AQ-1 through AQ-8 should be deleted, contingent upon approval of the July 24th Petition proposing removal of the natural gas fired auxiliary boilers. Additional changes to the conditions of certification for the MSP, including proposed language, are set forth in Attachment 1 to this Petition. These modifications are needed to conform the conditions of certification for the MSP to the project description changes proposed in the Petition.

3. NECESSITY OF PROPOSED AMENDMENT

The modifications to the project description are needed to reflect the changes to the MSP's general arrangement and replacement of certain equipment that has occurred during the final detailed engineering design phase for the MSP. The modifications to the conditions of certification are needed to conform the conditions to the proposed changes to the project description.

4. IS THE AMENDMENT BASED ON INFORMATION KNOWN AT THE TIME OF THE CERTIFICATION PROCEEDING?

Section 1769(a)(1)(C) states that "if the modification is based on information that was known by the petitioner during the certification proceeding, [the petition must contain] an explanation why the issue was not raised at that time." The proposed modifications are not based on information known by MSLLC during the certification proceeding as the decision to modify the general arrangement and project equipment occurred subsequent to approval by the Commission of the Project.

5. IS THE AMENDMENT BASED ON NEW INFORMATION THAT CHANGES OR UNDERMINES THE ASSUMPTIONS, RATIONALE, FINDINGS, OR OTHER BASES OF THE FINAL DECISION?

Section 1769 (a)(1)(D) of the Commission's Siting Regulations requires a discussion of whether the proposed amendment is based on new information that changes or undermines the assumptions, rationale, findings, or other bases of the final decision, and if so, an explanation of why the change should be permitted.

This amendment is based on new information regarding the final general arrangement and project components of the MSP determined during the final detailed engineering design phase for the Project. As explained below, while the new information changes the air quality assumptions relied upon in the Final Decision, the proposed modifications should be permitted as the modification will not result in any adverse impacts, and the Project will continue to be in compliance with all applicable LORS.

6. ENVIRONMENTAL ANALYSIS OF THE PROPOSED AMENDMENT AND COMPLIANCE WITH APPLICABLE LAWS, ORDINANCES, REGULATIONS AND STANDARDS

The proposed changes in the facility design and equipment were assessed to determine the magnitude of air quality impacts for comparisons with State and federal ambient air quality standards. Manufacturer specifications for the newly proposed emergency generators and firepumps are summarized below. The emergency equipment will be limited to testing of up to 30 minutes/day and 30 minutes/day using low-sulfur (15 ppm) diesel fuel. The air quality modeling shows that all engines can be tested simultaneously and the height of the emergency generator stacks can be reduced to 30 feet above grade level (firepump stacks remain unchanged at 20 feet above grade level). The modeled stack parameters and emissions for the facility equipment are shown in Table 12. Included in Table 12 are the mobile source emissions for onsite equipment (and fugitive dust for PM10/PM2.5), which were modeled as area sources. The mobile equipment was also modeled in the revised health risk assessment to include diesel

particulate matter. The proposed modifications represent a continuation of the current BACT determination. Table 6 summarizes the revised project emissions, which incorporates the proposed modifications described in Section 2.

Table 6 Revised Project Emissions Estimates, 2 Plant Totals

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

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

- No nonattainment pollutant is emitted in excess of 25 tons per year from the facility per Section (A)(3), therefore BACT is not required for each new permit unit.

- Each of the emergency electric generators (diesel engines) will emit NO_x at a rate of 30.91 lbs/hr and 30.91 lbs/day. Each of the firepumps will emit NO_x at a rate of 3.55 lbs/hr and 3.5 lbs/day. BACT for NO_x would be required on the emergency electric generators. The data presented to date indicates that these engines meet the MDAQMD BACT requirements, NSPS requirements, as well as CARB and EPA Tiered emissions standards.

- HTF system components, as listed in Attachment 2 will emit VOC at a rate of 24.76 lbs/day per plant. BACT for these field components is based upon the component design and maintaining the components (seals, valves, flanges, etc) in a leak free condition, etc. through an inspection/maintenance program.

- The HTF ullage system is anticipated to have maximum VOC emissions on the order of 4.34 lbs/day per plant. As such BACT is not triggered for this system/process.

As such, BACT is not triggered for the HTF ullage system under the MDAQMD NSR rules, therefore MSLLC believes that the presently designed system of VOC controls for the ullage system is sufficient for purposes of controlling VOC emissions to the maximum extent possible considering the design of the Project. Overall, the proposed Project will result in the following net decreases in project emissions from existing CEC-permitted limits (with only an increase in VOCs from that in the MDAQMD FDOC) as shown in Table 7.

Table 7 Existing and Revised Project Emissions Estimates, TPY

	NOx	CO	VOC	SOx	PM10/2.5
Existing (CEC SSA Emissions)	2.96	2.08	12.92	0.03	13.47
Existing AQMD FDOC Emissions	2.4	2.0	2.2	0.03	13.5
Revised	1.86	0.96	9.93	0.002	13.16
Changes from CEC	-1.1	-1.12	-2.27	-0.028	-0.31

SSA numbers +Increases -Decreases					
Changes from MDAQMD FDOC numbers +Increases -Decreases	-0.54	-1.04	+7.73	-0.028	-0.34
CO_2e emissions remain well below the PSD Tailoring rule limit for new sources, i.e., <100,000 tpy.					

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

A more detailed description of the environmental analysis of the proposed modifications is presented below.

- *Air Quality Standards and Background Air Quality Values*

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

Each federal or state ambient air quality standard (AAQS) is comprised of two basic elements: (1) a numerical limit expressed as an allowable concentration, and (2) an averaging time which specifies the period over which the concentration value is to be measured. Table 8 presents the current federal and state AAQS.

Table 8 State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Ozone	1-hr	0.09 ppm (180 µg/m^3)	-
	8-hr	0.070 ppm (137 µg/m^3)	0.075 ppm (147 µg/m^3) (3-year average of annual 4th-highest daily maximum)
Carbon Monoxide	8-hr	9.0 ppm (10,000 µg/m^3)	9 ppm (10,000 µg/m^3)
	1-hr	20 ppm (23,000 µg/m^3)	35 ppm (40,000 µg/m^3)
Nitrogen dioxide	Annual Average	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)
	1-hr	0.18 ppm (339 µg/m^3)	100 ppb (188 µg/m^3) (3-yr average of 98th percentiles)
Sulfur dioxide			
	24-hr	0.04 ppm (105 µg/m^3)	-

	3-hr	-	0.5 ppm (1,300 µg/m^3)
	1-hr	0.25 ppm (655 µg/m^3)	75 ppb (196 µg/m^3) (3-yr average of 99th percentiles)
Respirable particulate matter (10 micron)	24-hr	50 µg/m^3	150 µg/m^3
	Annual Arithmetic Mean	20 µg/m^3	-
Fine particulate matter (2.5 micron)	Annual Arithmetic Mean	12 µg/m^3	12.0 µg/m^3 (3-yr average)
	24-hr	-	35 µg/m^3 (3-yr average of 98th percentiles)
Sulfates	24-hr	25 µg/m^3	-
Lead	30-day	1.5 µg/m^3	-
	Rolling 3 Month Avg.	-	0.15 µg/m^3

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

The nearest criteria pollutant air quality monitoring sites to the proposed Project site would be the stations located at Lancaster, Mojave, Victorville, and Barstow. Table 9 presents the MDAQMD attainment status. Ambient monitoring data for these sites for the most recent three-year period are summarized in Table 10. Data from these sites are estimated to present a reasonable representation of background air quality for the Project site and impact area. Sulfur dioxide data was derived from the Victorville and Trona sites (the only sites in the regional area). It should be noted that the attainment and non-attainment status of the basin has not changed since the date of the Final Decision approving the Project in September, 2010.

Table 9 MDAQMD Attainment Status Table

Pollutant	Averaging Time	Federal Status	State Status
Ozone	1-hr	-	NA
Ozone	8-hr	NA	NA
CO	All	UNC/ATT	ATT
SO_2	All	UNC/ATT	ATT
NO_2	All	UNC/ATT	ATT
PM_{10}	All	NA	NA
$PM_{2.5}$	All	UNC/ATT	NA

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

Table 10 Monitoring Data Summary (Highest Monitored Values)

Pollutant	Site	Avg. Time	2010	2011	2012
Ozone, ppm	Victorville	1-hr	0.111	0.098	0.111
		8-hr	0.092	0.085	0.094
	Barstow	1-hr	0.097	0.093	0.090
		8-hr	0.078	0.083	0.084
PM_{10}, µg/m^3	Lancaster	24-hr	nd	nd	nd
		Annual	nd	nd	nd
	Mojave	24-hr	nd	nd	nd
		Annual	nd	nd	nd
	Victorville	24-hr	40/47.7	34/81.0	40/43.0
		Annual	18.7	20.2	N/A
	Barstow	24-hr	35/35.0	96/43.0	39/39.0
		Annual	N/A	21.5	19.2
$PM_{2.5}$, µg/m^3 (2005-2010)	Lancaster	24-hr	nd	nd	nd
		Annual	nd	nd	nd
	Mojave	24-hr	nd	nd	nd
		Annual	nd	nd	nd
	Victorville	24-hr	16	17	15
		Annual	8.6/8.5	9.3/8.9	7.6/7.2
	Barstow	24-hr	nd	nd	nd
		Annual	nd	nd	nd
CO, ppm	Lancaster	1-hr	nd	nd	nd
		8-hr	nd	nd	nd
	Mojave	1-hr	nd	nd	nd
		8-hr	nd	nd	nd
	Victorville	1-hr	15.9	1.9	2.1
		8-hr	5.2	1.5	1.8
	Barstow	1-hr	1.3	4.4	0.9
		8-hr	0.9	1.4	0.7
NO_2, ppm	Lancaster	1-hr	nd	nd	nd
		Annual	nd	nd	nd
	Trona	1-hr	nd	nd	nd
		Annual	nd	nd	nd
	Victorville	1-hr	0.137/0.065	0.075/0.060	0.056/0.050
		Annual	0.015	0.015	0.013
	Barstow	1-hr	0.062/0.058	0.077/0.062	0.146/0.096
		Annual	0.017	0.017	0.017
SO_2, ppm (2009-2011)	Victorville	1-hr	0.008	0.052	0.013
		24-hr	0.006	0.007	0.007
	Trona	1-hr	0.011	0.010	0.014
		24-hr	0.003	0.003	0.006
	Lancaster	1-hr	nd	nd	nd
		24-hr	nd	nd	nd
	Barstow	1-hr	nd	nd	nd

		24-hr	nd	nd	nd

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

Table 11 presents the revised background values for the years 2010 through 2012.

Table 11 Revised Background Air Quality Values (2010-2012)

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

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

- *Modeling and Impact Analysis of the Proposed Modifications*

The proposed changes in the facility design and equipment were assessed to determine the magnitude of air quality impacts for comparisons with State and federal ambient air quality standards. Manufacturer specifications for the newly proposed emergency generators and firepumps are summarized below. The emergency equipment will be limited to testing of up to 30 minutes/day and 30 minutes/day using low-sulfur (15 ppm) diesel fuel. The air quality modeling shows that all engines can be tested simultaneously and the height of the emergency generator stacks can be reduced to 30 feet above grade level (firepump stacks remain unchanged at 20 feet above grade level). The modeled stack parameters and emissions for the facility equipment are shown in Table 12. Included in Table 12 are the mobile source emissions for onsite equipment (and fugitive dust for PM10/PM2.5), which were modeled as area sources. The mobile equipment was also modeled in the revised health risk assessment to include diesel particulate matter.

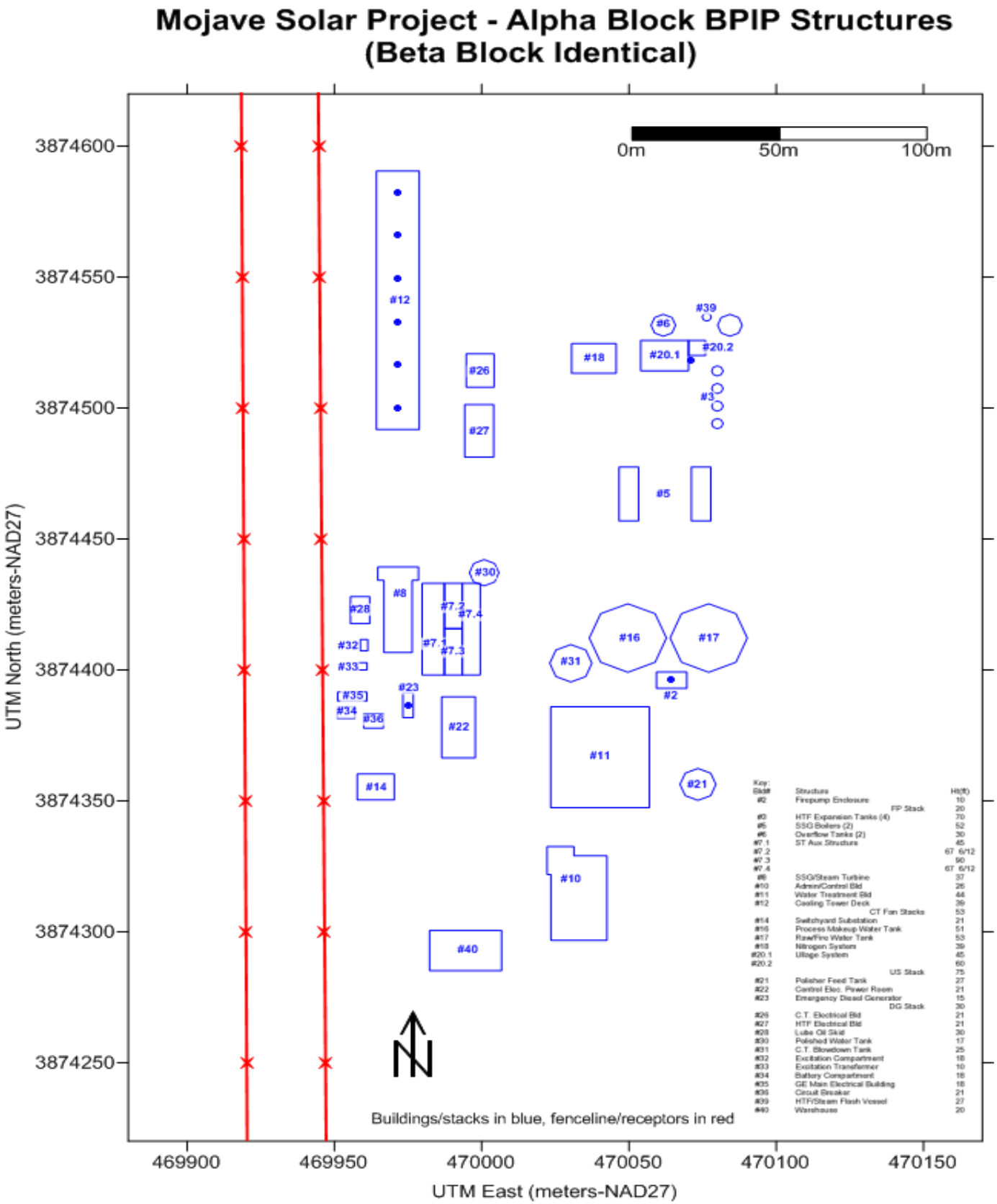
The air quality modeling analyses for the emergency equipment were performed as closely as possible to the original analyses. The original receptor grids and 2001-2004 Daggett meteorological data were used with the same USEPA model, AERMOD (Version 12345). With the amendment, there are no changes to the existing Project facility boundary or fence line.

However, changes in the latest version of AERMOD as well as recent modeling guidance for assessing compliance with the 1-hour NO_2 National Ambient Air Quality Standard (NAAQS) issued by the California Air Pollution Control Officers Association (CAPCOA) Engineering Managers (*"Modeling Compliance of The Federal 1-Hour NO_2 NAAQS, October 27, 2011)* required some revisions in the modeling analyses.

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

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

Figure 1


Mojave Solar Project - Alpha Block BPIP Structures
(Beta Block Identical)
0m
50m
100m
3874600
3874550
3874500
3874450
3874400
3874350
3874300
3874250
UTM North (meters-NAD27)
469900
469950
470000
470050
470100
470150
UTM East (meters-NAD27)
#12
#26
#27
#39
#6
#18
#20.1
#20.2
#3
#5
#30
#8
#28
#7.2
#7.4
#7.1
#7.3
#32
#33
#23
[#35]
#34
#36
#22
#14
#16
#17
#31
#2
#11
#21
#10
#40
Buildings/stacks in blue, fenceline/receptors in red

Lastly, the NO_2 modeling for determining compliance with the 1-hour NAAQS (submitted for the project in May 2010) had to be revised in accordance with the latest October 2011 CAPCOA guidance. NO_2 impacts in the revised analyses were modeled with AERMOD using the Ozone Limiting Method (OLM) to assess compliance with the 1-hour NAAQS, as well as the 1-hour California Ambient Air Quality Standards (CAAQS) and annual standards. Twenty percent (20%) of the NOx emissions were assumed to be NO_2 for all sources (CAPCOA-recommended value for diesel engines) with the AERMOD default 90% equilibrium ratio. Since the predominant facility emissions to be modeled are emergency equipment that only operate infrequently (i.e., tested 30 minutes each week), contributions to the 1-hour NAAQS design concentration are expected to be close to zero (see page 28 of the CAPCOA document). Therefore, a Tier 3 (PVMRM) Option 11 procedure was used (see pages 34-41 of the CAPCOA document) and, for assessing compliance with the 1-hour NAAQS, an average hourly emission rate (AER) was used, equal to the annual NOx emission rate (see page 29 of the CAPCOA document).

Compliance with the 1-hour CAAQS was assessed using the maximum hourly emission rate consistent with the nature of the California standards. Just like the May 2010 project submittal, hourly ozone and NO_2 data, measured at Barstow and concurrent with the Daggett meteorological data, were used in the NO_2 modeling analyses. However, gap filling procedures had to be revised based on the latest CAPCOA document. Single missing hours were interpolated first (see page 19 of the CAPCOA document). Because a significant fraction of the days in the monitoring data had two consecutive missing hours each night (due to daily monitoring site QA procedures), missing data for two consecutive hours were also replaced with interpolated values. Because these missing data occur at the same time each night (i.e., were not random), data filling procedures described below would not be capable of filling in these missing data. Since these two-hour periods of missing data generally occur around midnight, the missing data replaced by interpolation would be expected to represent hours of relatively low concentrations anyway (see page 15 of the CAPCOA document). Finally, after interpolating missing data periods of one and two consecutive hours, any remaining missing data were filled in with the hourly maximum measurement for that month and year, which is listed as gap filling Simple Fill Method 5 and Complex Fill Option 1 (see page 20 of the CAPCOA document).

- *Changes in Modeled Impacts*

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

compliance with all annual NAAQS and CAAQS except the annual PM2.5 (for which the multi-year average of the annual impact was used).

Emissions due to facility operations were modeled for two different scenarios. First, facility impacts due to the stationary point sources alone (emergency generators, fire pumps, and cooling tower cells) were modeled as shown on Table 12. These modeled impacts are traditionally used in regular air permit applications to Air Pollution Control Districts, consistent with USEPA modeling requirements. Second, facility impacts were modeled for stationary point sources which were also combined with mobile source tailpipe and fugitive dust emissions as shown on Table 12. This style of analysis including mobile and fugitive sources is typical of an Environmental Impact Statement like the CEC Application for Certification (AFC). The mobile tailpipe and fugitive dust emissions were modeled as area sources with an effective height of 0.5 meters and an initial vertical sigma-z of 0.0 meters.

The results of the modeling analyses are presented in Tables 13 and 14. As noted on the two tables, there is very little difference between the two analyses with respect to overall concentrations, except for PM10 and PM2.5. This is because the mobile source tailpipe emissions contribute little to the overall maximum facility impacts. However, the fugitive dust emissions increase maximum 24-hour PM10 and PM2.5 impacts by 15% and 10%, respectively, and maximum annual PM10 and PM2.5 impacts by about 550% and 110%, respectively. Compliance with the NAAQS and CAAQS is shown in the revised analysis for all pollutants with background concentrations less that the standards – namely, NO_2, CO, SO_2, 24-hour PM10 NAAQS, and PM2.5. For PM10, the background concentrations already exceed the California 24-hour and annual standards even in the absence of impacts due to emissions from the Project. Therefore, combined facility impacts with background exceed the PM10 CAAQS. Since Project impacts for stationary point sources are less than the significant impact levels for annual averaging times for PM10 and PM2.5, the Project amendment would not cause nor contribute to exceedances of the CAAQS, which are due solely to high background concentrations.

Table 12 Modeled Stack Parameters And Emission Rates								
Point and Area Emissions Sources[a]	**Release Height (m)**	**Stack Temp. (Kelvins)**	**Exhaust Velocity (m/s)**	**Stack Diameter (m)**	**Emission Rates (g/s or g/s/m^2)**			
					NOx	**SO_2**	**CO**	**PM10/ PM2.5**
Averaging Period: 1-hour for Normal Operating Conditions								
Mobile/Fugitive Sources	0.5	N/A	N/A	N/A	7.298E-9	1.303E-11	4.344E-9	–
Emergency Generator	9.144	753.2	104.16	0.3048	2.027E-0[b]	1.976E-3	1.108E-0	–
Fire Pump	6.096	723.7	39.66	0.2032	2.236E-1[b]	3.791E-4	5.111E-2	–
Averaging Period: 3-hours for Normal Operating Conditions								
Mobile/Fugitive Sources	0.5	N/A	N/A	N/A	–	1.303E-11	–	–
Emergency Generator	9.144	753.2	104.16	0.3048	–	6.587E-4	–	–
Fire Pump	6.096	723.7	39.66	0.2032	–	1.264E-4	–	–
Averaging Period: 8-hours for Normal Operating Conditions								
Mobile/Fugitive Sources	0.5	N/A	N/A	N/A	–	–	4.344E-9	–
Emergency Generator	9.144	753.2	104.16	0.3048	–	–	1.385E-1	–
Fire Pump	6.096	723.7	39.66	0.2032	–	–	6.389E-3	–
Averaging Period: 24-hours for Normal Operating Conditions								
Mobile/Fugitive Sources	0.5	N/A	N/A	N/A	–	1.303E-11	–	8.128E-8/ 1.786E-8
Emergency Generator	9.144	753.2	104.16	0.3048	–	8.234E-5	–	2.639E-3
Fire Pump	6.096	723.7	39.66	0.2032	–	1.580E-5	–	3.194E-4
Cooling Tower	15.545	296.0	6.66	9.1440	–	–	–	3.139E-2
Averaging Period: Annual for Normal Operating Conditions								
Mobile/Fugitive Sources	0.5	N/A	N/A	N/A	7.298E-9	–	–	8.128E-8/ 1.786E-8
Emergency Generator	9.144	753.2	104.16	0.3048	1.203E-2	–	–	3.760E-4
Fire Pump	6.096	723.7	39.66	0.2032	1.327E-3	–	–	4.551E-5
Cooling Tower	15.545	300.3	9.41	9.1440	–	–	–	3.139E-2

[a] Each emergency generator, firepump, and cooling tower cell. Cooling tower flow rates and temperatures represent winter conditions for 24-hour impacts (worst-case conditions) and average ambient conditions for annual impacts.

[b] For assessing compliance with 1-hour NAAQS, the Average Hourly Emission Rate (AER) equal to the annual emission rate was used for emergency equipment tested only intermittently consistent with the CAPCOA document.

Table 13 Air Quality Impact Summary for Normal Operating Conditions for Stationary Point Sources

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

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

Table 14 Air Quality Impact Summary for Normal Operating Conditions for Stationary Point and Mobile/Fugitive Sources

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

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

- *Revised Health Risk Evaluation*

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

- Deletion of the auxiliary boiler emissions;

- Revisions (short-term increase in lb/hr but no increase in tpy) to the VOC control systems emissions;
- Revisions (increase) to the fugitive emissions due to updated component counts;
- Revisions to the emergency equipment emissions;
- Revisions to stack parameters, i.e., heights, diameters, temperatures, flow rates, etc.;
- Revisions to the site processes and equipment layout.

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

Environmental consequences potentially associated with the operation of the Project are potential human exposure to chemical substances emitted to the air. The human health risks potentially associated with these chemical substances were evaluated in a health risk analysis (HRA). The chemical substances potentially emitted to the air from the revised ullage system, cooling tower, diesel engines and other miscellaneous support systems, including fugitives are listed in Table 15. Maximum hourly emissions were used for calculating acute hazard index (HI) values, while annual emissions were used to calculate the cancer risk and chronic HI values.

Table 15 Chemical Substances Potentially Emitted to the Air From the Project

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

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

- *Public Health Impact Study Methods*

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

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

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

- *Characterization of Risks from Toxic Air Pollutants*

The excess lifetime cancer risk associated with concentrations in air estimated for the Project MIR location is calculated to be 6.77×10^{-7}. Excess lifetime cancer risks less than 10×10^{-6} (with T-BACT) are unlikely to represent significant public health impacts that require additional controls of facility emissions. Risks higher than 1×10^{-6} may or may not be of concern, depending upon several factors. These include the conservatism of assumptions used in

risk estimation, size of the potentially exposed population, and toxicity of the risk-driving chemicals. Health effects risk thresholds are listed in Table 16. Risks associated with pollutants potentially emitted from the Project are presented in Table 17. As described previously, human health risks associated with emissions from the proposed Project are unlikely to be higher at any other location than at the location of the MIR. If there is no significant impact associated with concentrations in air at the MIR location, it is unlikely there would be significant impacts in any other location in the vicinity of the Project.

Table 16 Significant Health Effect Threshold Levels for MDAQMD

Risk Category	**Risk Threshold**
Cancer Risk	>1.0 x 10^{-6} without TBACT >10 x 10^{-6} with TBACT
Chronic Hazard Index	>1.0
Acute Hazard Index	>1.0
Cancer Burden	>0.5

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

Table 17 Revised Health Risk Assessment Summary

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

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

No specific health related studies were identified which pertain to the local Project area for any identified toxic air pollutant or identified specific population. The various MATES studies prepared by the SCAQMD are targeted at the major district urban areas, not the eastern desert regions where the project is located.

The estimates of excess lifetime cancer risks and non-cancer risks associated with chronic or acute exposures fall below thresholds used for regulating emissions of toxic pollutants to the air. Historically, exposure to any level of a carcinogen has been considered to have a finite risk

of inducing cancer. In other words, there is no threshold for carcinogenicity. Since risks at low levels of exposure cannot be quantified directly by either animal or epidemiological studies, mathematical models have estimated such risks by extrapolation from high to low doses. This modeling procedure is designed to provide a highly conservative estimate of cancer risks based on the most sensitive species of laboratory animal for extrapolation to humans. In other words, the assumption is that humans are as sensitive as the most sensitive animal species. Therefore, the true risk is not likely to be higher than risks estimated using unit risk factors and is most likely lower, and could even be zero.

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

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

- *Operation Odors*

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

- *Revised Cumulative Impacts*

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

- Low project operational emissions levels of air toxic substances.
- Insignificant risk resulting from project operations.

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

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

As discussed in the Final Decision, the geographic area considered for cumulative impacts on public health is only within the project boundaries or within ½ mile of the project.[9] Thus, unless a significantly sized source of HAPs is located within ½ mile of the proposed new source, it is highly unlikely that the cumulative emissions of the sources will result in any significant health related impacts. There are no significant sources (existing or proposed) of HAPs within ½ mile of the project site, therefore it is highly unlikely that the cumulative emissions of the sources will result in any significant health related impacts.

Finally, there will be no additional ground disturbance from the change in project design, as all changes will be contained within the originally permitted power block area. Therefore, there will be no potential adverse impacts relating to biological resources, soils and water, cultural resources, and geological and paleontological resources. The amount of water used by the MSP for operations will remain within permitted limits, and will therefore not result in any changes to the conclusions made in the Final Decision or additional impacts. The changes to the ullage system are not expected to result in any significant changes to noise levels from the MSP, and the Project will continue to comply with all noise levels and conditions of certification set forth in the Final Decision, which will ensure that there are no additional noise impacts as a result of the proposed modifications.

The MSP will continue to comply with all applicable laws, ordinances, regulations, and standards.

7. POTENTIAL EFFECTS ON THE PUBLIC RELATED TO THE PROPOSED AMENDMENT

Section 1769(a)(1)(F) requires that a petition discuss how the modification affects the public.

As discussed above in Section 6 the proposed modification will not result in adverse environmental or public health impacts. Therefore, this modification will not adversely the public and will not change the conclusions regarding the environmental or public health impact of the project contained in the Final Decision.

[9] Final Decision, p. 171.

8. POTENTIAL EFFECTS ON PROPERTY OWNERS RELATED TO THE PROPOSED AMENDMENT AND LIST OF PROPERTY OWNERS

Section 1769(a)(1)(H) requires a list of property owners potentially affected by the modification. This proposed modification merely updates the project description, and will have no adverse environmental effects. Therefore, no property owners will be affected by the proposed modifications. Nevertheless, the following table lists property owners within two miles of the Project.

APN	Owner Name	Address	Description of Use
049017111	Leimbach, Walter W.	15635 Lockhart Rd, Hinkley, CA 92347	Manufactured home on fee land, in subdivision
04901711	Cardiel, Maria	15563 Lockhart Rd, Hinkley, CA 92347	Two Single Family Residences
049012116	Holmes, Constance M.	41374 Harper Lake Rd, Hinkley, CA 92347	Manufactured Home, fee land
04901711	Sciortino, Vito and Sciortino, Loretta	15563 Lockhart Ranch Rd, Hinkley, CA 92347	Single Family Residence
049017133	Estate of Barbara Kalk, c/o Michael James Valenzuela	41361 Edie Rd, Hinkley, CA 92347	Single Family Residence
04901713	Ajemundt, Teodoro	15654 Roy St, Hinkley, CA 92347	Manufactured Home, fee land
049012137	Olivas, Ricardo	41234 Harper Lake Rd, Hinkley, CA 92347	Bees, worms, etc.

9. CONCLUSION

The Commission should approve this amendment as the overall potential emissions from the MSP as analyzed in the Final Decision will decrease as a result of the proposed modifications to the project description. Moreover, the proposed modifications will not result in any other adverse environmental impacts or risks to public health.

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

Table of Proposed Modifications to Abengoa Mojave Solar Project Certification

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

Proposed Modifications to Abengoa Mojave Solar Project Certification

ITEM NO.	TOPIC	AS PERMITTED IN FINAL DECISION	PROPOSED MODIFICATION	REASON	SECTION/ PAGES AFFECTED
Final Decision Project Description Modifications					
1.	Auxiliary boiler	Natural-gas-fired auxiliary boiler.	Remove description of auxiliary boilers.	If the July 24th Petition is approved, this reference can be deleted. Freeze protection will be done with an electric heater and gas will not be needed for other functions.	Introduction Section A, page 3
2.	Natural gas supply	Natural gas supplied for use of auxiliary boiler, steam seal maintenance and to assist with startups.	Remove need for natural gas supply.	See above.	I 2.b, page 16
3.	Natural gas supply	Natural gas supplied for use of auxiliary boiler, steam seal maintenance and to assist with startups.	Remove need for natural gas supply.	See above.	I, page 20
4.	Natural gas supply	Natural gas supplied for use of auxiliary boiler, steam seal maintenance and to assist with startups.	Remove need for natural gas supply.	See above.	II 2., page 22
5.	Natural gas supply	Natural gas supplied for use of auxiliary boiler, steam seal maintenance and to assist with startups.	Remove need for natural gas supply.	See above.	Page 55
6.	Natural gas supply	Natural gas supplied for use of auxiliary boiler, steam seal maintenance and to assist with startups.	Remove need for natural gas supply.	See above.	IV.A, page 59

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

Proposed Modifications to Abengoa Mojave Solar Project Certification

ITEM NO.	TOPIC	AS PERMITTED IN FINAL DECISION	PROPOSED MODIFICATION	REASON	SECTION/ PAGES AFFECTED
7.	Natural gas supply	Natural gas supplied for use of auxiliary boiler, steam seal maintenance and to assist with startups.	Remove need for natural gas supply.	See above.	IV.B, page 78
8.	Use of fossil fuels	Natural gas supplied for use of auxiliary boiler, steam seal maintenance and to assist with startups.	Remove need for fossil fuels.	See above.	IV.B.1, page 79
9.	Natural gas supply	Natural gas supplied for use of auxiliary boiler, steam seal maintenance and to assist with startups.	Remove need for natural gas supply, use of fossil fuels.	See above.	IV.B, page 82
10.	Natural gas supply	Natural gas supplied for use of auxiliary boiler, steam seal maintenance and to assist with startups.	Remove need for natural gas supply.	See above.	IV.C.3, page 86
11.	Natural gas supply	Natural gas supplied for use of auxiliary boiler, steam seal maintenance and to assist with startups.	Remove need for natural gas supply.	See above.	IV.C, page 88
12.	CO_2 emissions	10,018 MTCO2E for auxiliary HTF heaters.	Delete reference.	See above.	V.A.4, page 117
13.	CO_2 emissions	183.2 MTCO2E for emergency generator engine.	Update	Size of emergency generator has changed.	V.A.4, page 117
14.	CO_2 emissions	8.1 MTCO2E for fire pump engine.	Update	Size of fire pump engine has changed.	V.A.4, page 117
15.	CO_2 emissions	11,000 metric tonnes of CO_2-equivalent GHG emissions	Update	Size or use of equipment has changed.	V.A.4, page 117

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

Proposed Modifications to Abengoa Mojave Solar Project Certification

ITEM NO.	TOPIC	AS PERMITTED IN FINAL DECISION	PROPOSED MODIFICATION	REASON	SECTION/ PAGES AFFECTED
16.	CO_2 emissions	11,000 MTCO2, emissions performance factor of 0.018 MTCO2/MWh.	Update	Size or use of equipment has changed.	V.A, page 126
17.	Air quality	Air Quality Table 1 - Federal and State Ambient Air Quality Standards.	Update per Table 8 of Petition to Amend.	Some updates to standards since the Final Decision.	V.B, page 129
18.	Air quality	Air Quality Table 2 - MDAQMD Federal and State Attainment Status.	Update per Table 9 of Petition to Amend.	Note that the attainment and non-attainment status of the basin has not changed since the project from the date of the final Commission Decision in September, 2010.	V.B.1, page 129
19.	Auxiliary boiler	Natural-gas-fired auxiliary boiler.	Remove auxiliary boilers.	If the July 24th Petition is approved, this reference can be deleted. Freeze protection will be done with an electric heater and gas will not be needed for other functions.	V.B.6, page 135
20.	Fire water pump engine	346-hp.	Replace the current two (2) 346 hp Tier III fire pump engines with two (2) larger 575-617 hp Tier III engines.	Size of fire pump engine has changed.	V.B.6, page 135
21.	Diesel emergency generator	4,160-hp.	Replace ~4,160-hp (~2,500kW) generator with 2,280kW.	Size of emergency generator has changed.	V.B.6, page 135
22.	Expansion vessels	8 HTF expansion vessels on each power block.	Update to 4 expansion vessels.	4 expansion vessels on each power block.	V.B.6, page 135

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

Proposed Modifications to Abengoa Mojave Solar Project Certification

ITEM NO.	TOPIC	AS PERMITTED IN FINAL DECISION	PROPOSED MODIFICATION	REASON	SECTION/ PAGES AFFECTED
23.	HTF piping components	Component count of 3,247 valves, 8,120 flanges/connectors, 24 pump seals, and 16 pressure relief valves.	Update component count.	Detailed engineering resulted in updated counts.	V.B.6, page 135
24.	HTF waste	Spent HTF waste loadout.	Delete reference.	Not part of modified ullage system.	V.B.6, page 135
25.	Auxiliary boiler	Natural-gas-fired auxiliary boiler equipment description.	Delete reference to auxiliary boilers.	If the July 24th Petition is approved, this reference can be deleted. Freeze protection will be done with an electric heater and gas will not be needed for other functions.	V.B, page 149
26.	Auxiliary boiler	Natural-gas-fired auxiliary boiler.	Delete reference to auxiliary boilers.	See above.	V.C.4, page 169
27.	Public health	Table 1 - Operation Hazard/Risk at Point of Maximum Impact.	Update per Tables 15 and 16 of Application for Permit Amendment.	Health Risk Assessment updated.	V.C.4, page 169
28.	Auxiliary boiler	Natural-gas-fired auxiliary boiler.	Delete reference to auxiliary boilers.	If the July 24th Petition is approved, this reference can be deleted. Freeze protection will be done with an electric heater and gas will not be needed for other functions.	V.D.1, page 175
29.	Natural gas supply	Natural gas supplied for use of auxiliary boiler and domestic use such as space heating.	Remove need for natural gas supply.	See above.	V.E, page 193
30.	Natural gas supply	Natural gas.	Remove need for natural gas supply.	See above.	V.E.1, page 194
31.	Natural gas supply	Natural gas.	Remove need for natural	See above.	V.E.1, page

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

Proposed Modifications to Abengoa Mojave Solar Project Certification

ITEM NO.	TOPIC	AS PERMITTED IN FINAL DECISION	PROPOSED MODIFICATION	REASON	SECTION/ PAGES AFFECTED
			gas supply.		195
32.	Natural gas supply	Natural gas.	Remove need for natural gas supply.	See above.	V.E, page 198
33.	Natural gas supply	Natural gas supplied for use of auxiliary boiler and domestic use such as space heating.	Remove need for natural gas supply.	See above.	V.E, page 210
34.	Natural gas supply	Natural gas.	Remove need for natural gas supply.	See above.	VI.1., page 230
Modifications to Conditions of Certification					
35.	Conditions of Certification AQ-1 through AQ-8	These conditions of certification are all applicable to the originally proposed natural gas fired auxiliary boilers.	Delete conditions AQ-1 through AQ-8.	If the July 24th Petition is approved, this reference can be deleted. The natural gas fired auxiliary boilers will be replaced with an electric heater; therefore, these conditions are no longer needed.	
36.	Condition of Certification AQ-11	The expansion tanks (5), nitrogen-condensing tank and two vertical HTF storage tanks shall be operated at all times under a nitrogen blanket.	The expansion tanks (~~5~~ 4), ~~nitrogen-condensing tank~~ low boiler condensate receiver vessel and two vertical HTF storage tanks shall be operated at all times under a nitrogen blanket.	Revise to reflect the decreased number of expansion vessels has decreased and renaming of equipment during detailed engineering.	V.B, page 151
37.	Condition of Certification AQ-12	The ullage/expansion system nitrogen vending shall be carried out only through vents which have	The ullage/expansion system nitrogen vending shall be carried out only	Revise to reflect project description changes made during detailed engineering.	V.B, page 152

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

Proposed Modifications to Abengoa Mojave Solar Project Certification

ITEM NO.	TOPIC	AS PERMITTED IN FINAL DECISION	PROPOSED MODIFICATION	REASON	SECTION/ PAGES AFFECTED
		vapor condensing coolers which shall be maintained at or below 120 degrees Fahrenheit.	through vents which have ~~vapor condensing coolers which shall be maintained at or below 120 degrees Fahrenheit~~. a scrubber and carbon bed adsorption system.		
38.	Condition of Certification AQ-13	The HTF storage tank shall have in place a properly operating liquid HTF air cooler which shall maintain the tank at or below 165 degrees Fahrenheit.	The HTF storage tank shall have in place a properly operating ~~liquid HTF air cooler~~ water-cooled liquid HTF cooler which shall maintain the tank at or below 165 degrees Fahrenheit.	Revise to reflect project description changes made during detailed engineering.	V.B, page 152
39.	Condition of Certification AQ-14	The nitrogen condensing tanks shall be maintained at or below 176 degrees Fahrenheit.	The ~~nitrogen condensing tanks~~ low boiler condensate receiver vessel shall be maintained at or below 176 degrees Fahrenheit.	Revise to reflect renaming of equipment during detailed engineering.	V.B, page 152
40.	Equipment Description applicable to conditions AQ-30 through AQ-40	Two- 190 hp diesel fueled emergency generator engines, each driving a generator.	Two- ~~190 hp~~ 2,280 kW diesel fueled emergency generator engines, each driving a generator.	Please note, the language in the Final Decision contained an error, and should have stated "4160 hp." This description should be revised to reflect the changed size of the emergency generator.	V.B, page 157
41.	Condition of	No two permitted stationary	Delete this condition.	Air modeling with the new	V.B, page

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

Proposed Modifications to Abengoa Mojave Solar Project Certification

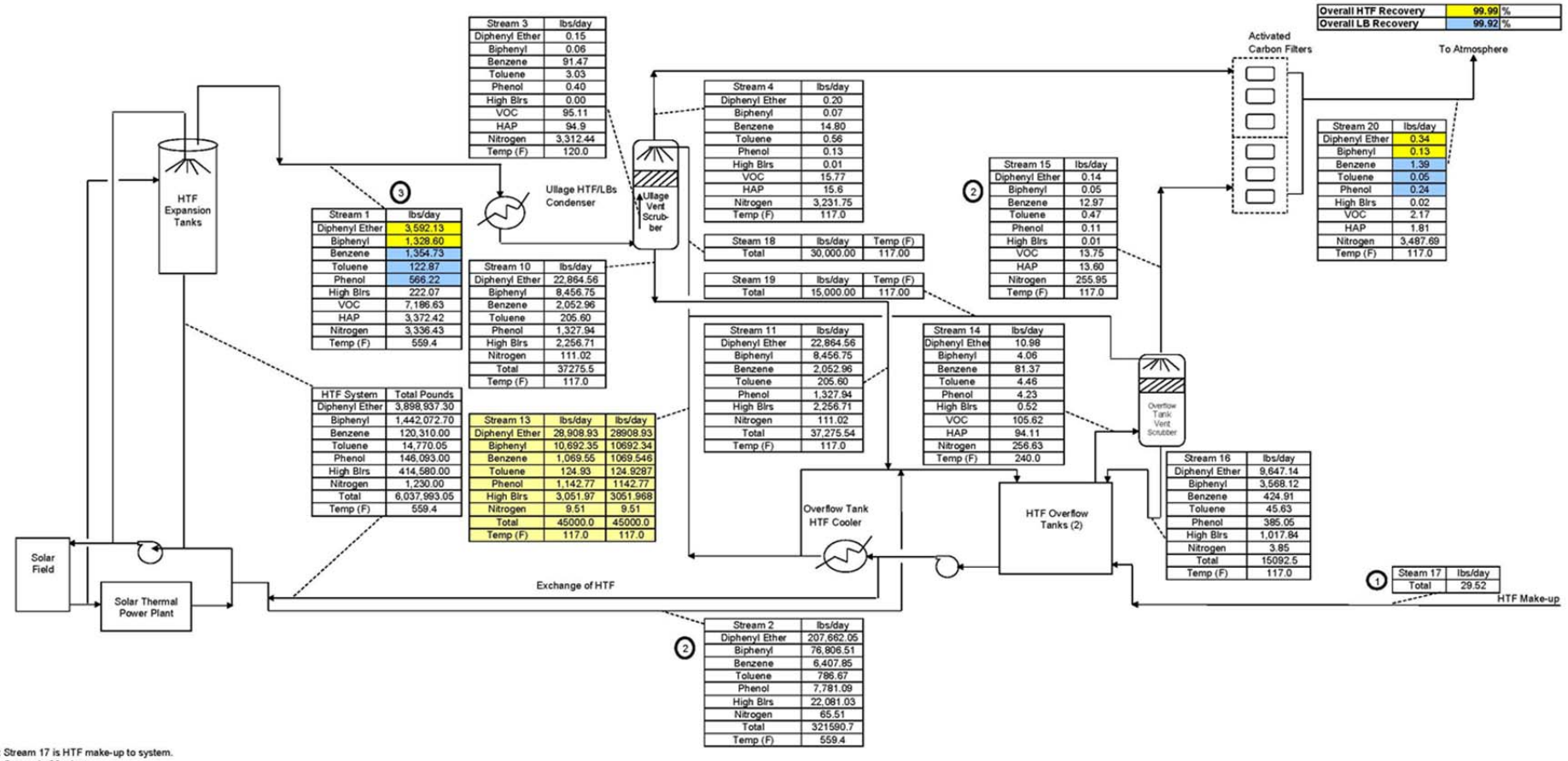
ITEM NO.	TOPIC	AS PERMITTED IN FINAL DECISION	PROPOSED MODIFICATION	REASON	SECTION/ PAGES AFFECTED
	Certification AQ-37	emergency engines (emergency generators or emergency fire pump engines) shall be readiness tested on the same calendar day.		engines demonstrates that this restriction can be removed to allow for simultaneous testing of the equipment.	158
42.	Condition of Certification AQ-38	This engine shall exhaust through a stack at a minimum height of 60 feet.	This engine shall exhaust through a stack at a minimum height of ~~60~~ 30 feet.	Air modeling with the new engines demonstrates that the stack height can be lowered.	V.B., page 159
43.	Equipment Description applicable to conditions AQ-41 through AQ-49	Two- 346 hp diesel fueled emergency generator engines, each driving a fire suppression water pump.	Two- ~~346~~ 575-617 hp diesel fueled emergency generator engines, each driving a fire suppression water pump.	Revise to reflect project description changes made during detailed engineering.	V.B, page 159
44.	Conditions of Certification AQ-50 through AQ-59	These conditions of certification are all applicable to the originally proposed gasoline storage tank.	Delete conditions AQ-50 through AQ-59.	If the July 24th Petition is approved, this reference can be deleted, these conditions can be deleted. Freeze protection will be done with an electric heater and gas will not be needed for other functions.	V.B, page 161

ATTACHMENT 2
REVISED PETITION TO AMEND THE COMMISSION'S CERTIFICATION OF THE ABENGOA MOJAVE SOLAR PROJECT 09-AFC-5C

HTF Ullage System Process Flow Block Diagram

and

HTF System Component Count and Fugitive Emissions Estimate



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

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

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

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

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

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

HTF System Component Count and Fugitive Emissions Estimate 9/24/2013 17:38

Mojave Solar Project

Component	Single Plant Count #	Service	EF lb/hr/src	hrs/day	lbs/hr	lbs/day	lbs/yr	tons/yr
Valves								
Sealed Bellows/Flex Hoses	5063	Gas/Vapor & Lt. Liquid	0	24	0.000	0.000	0.000	0.000
	0	Lt. Liquid	0	0	0.000	0.000	0.000	0.000
Non-Bellows Sealed	373	Lt. Liquid	0.000555	16	0.207	3.312	1208.968	0.604
		Hvy. Liquid	0.000019	8	0.007	0.057	20.694	0.010
Pumps								
Sealess Type	0	Lt. Liquid	0	0	0.000	0.000	0.000	0.000
Double Mech Seals or Equivalent	23	Lt. Liquid	0.00186	16	0.043	0.684	249.835	0.125
		Hvy. Liquid	0.000053	8	0.001	0.010	3.559	0.002
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	515	Lt. Liquid	0.0000165	16	0.008	0.136	49.625	0.025
		Hvy. Liquid	0.0000165	8	0.008	0.068	24.813	0.012
PRVs	13	Gas	0.0985	16	1.281	20.488	7478.120	3.739
	22	Hvy. Liquid	0.000019	8	0.000	0.003	1.221	0.001
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
Plants per Facility:	2		Single Plant Total		1.56	24.76	9036.83	4.52
Operating Days/Yr:	365		Facility Total		3.11	49.52	18073.67	9.04

Notes:

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

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

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

Fugitive Toxics/HAPs vapor:		MSDS		Single Plant		Two Plants			
	Substance	**% wt**	**wt frac**	**lbs/hr**	**lbs/yr**	**lbs/hr**	**lbs/yr**	**tons/yr**	**lb/day**
	benzene	18.9	0.189	0.29	1707.96	0.59	3415.92	1.71	14.12
	phenol	7.9	0.079	0.12	713.91	0.25	1427.82	0.71	5.90
	biphenyl	18.5	0.185	0.29	1671.81	0.58	3343.63	1.67	13.82
	toluene	1.7	0.017	0.03	153.63	0.05	307.25	0.15	1.27
	diphenyl ether	50	0.5	0.78	4518.42	1.56	9036.83	4.52	37.34
	dibenzofuran	3.1	0.031	0.05	280.14	0.10	560.28	0.28	2.32

(4) Decomposition data from HTF mfg MSDS (Solutia) and other related MSDS data.
(5) Fugitive emissions components are based on Expansion Vessels vapor stream compositions of the Aspen output schematics in Attachment 1.

ATTACHMENT 3
REVISED PETITION TO AMEND THE COMMISSION'S CERTIFICATION OF THE ABENGOA MOJAVE SOLAR PROJECT 09-AFC-5C

Alpha And Beta Proposed General Arrangements

REVISIONS NO.	DATE	DESCRIPTION	BY	BY	BY
13	08/08/13	ISSUED FOR CONSTRUCTION	KCM	ABA, ABD	MZA, APF
12	05/21/13	CHANGES IN POWER BLOCK	ABA	MMW	
11	04/22/13	CHANGES IN POWER BLOCK CLOSING IN HTF MAIN PIPE	ABA	MMW	
10	04DEC12	INCLUDED 230W LINE POWER BLOCK STRUCTURES UPDATED	ABA	MMW	
9	17OCT12	INCLUDED METEOROLOGICAL STATIONS REVISED PERIMETER FENCE & ENGINEERING OFFIECES	ABA	MMW	
		UPDATED CENTRAL PLANT LAYOUT AND PIPING INCLUDED STRUCTURES AND FOUNDATIONS ON SOLAR FIELD			
8	31AUG12	UPDATED CENTRAL PLANT LAYOUT	ABA	MMW	
7	30JUL12	E.SUBSTATIONS NEW DIMENSIONS AND LOCATIONS REMOVED GAS LINE & EXISTING POWERLINE	ABA	MMW	
6	05JUN12	REVISED MAINTENANCE ROAD RADII AS NEEDED UPDATED CENTRAL PLANT	MJS	DRD	MZA
		(NOT CLOUDED FOR CLARITY) REV LAYOUT SO UPPER PROPERTY BOUNDARY			
		IS SHOWN, REV POWERLINE LINETYPE HTF LOOPS SHOWN AROUND ALPHA ONLY			
5	16MAR12	REV THE CENTRAL PLANT LAYOUT	MJS	DRD	MZA
4	10FEB12	REMOVED FENCING NOTE & 'PROPOSED' FROM NOTATIONS, REVISED ROAD/GATES IN N. ALPHA	MJS	DRD	MZA

PE STAMP

08/08/13	FOR CONSTRUCTION
ISSUE DATE	PURPOSE OF ISSUE

AG ENGINEERING

ABENER TEYMA MOJAVE

ABENGOA SOLAR

SOLAR FIELD LAYOUT
FOR ALPHA PLANT

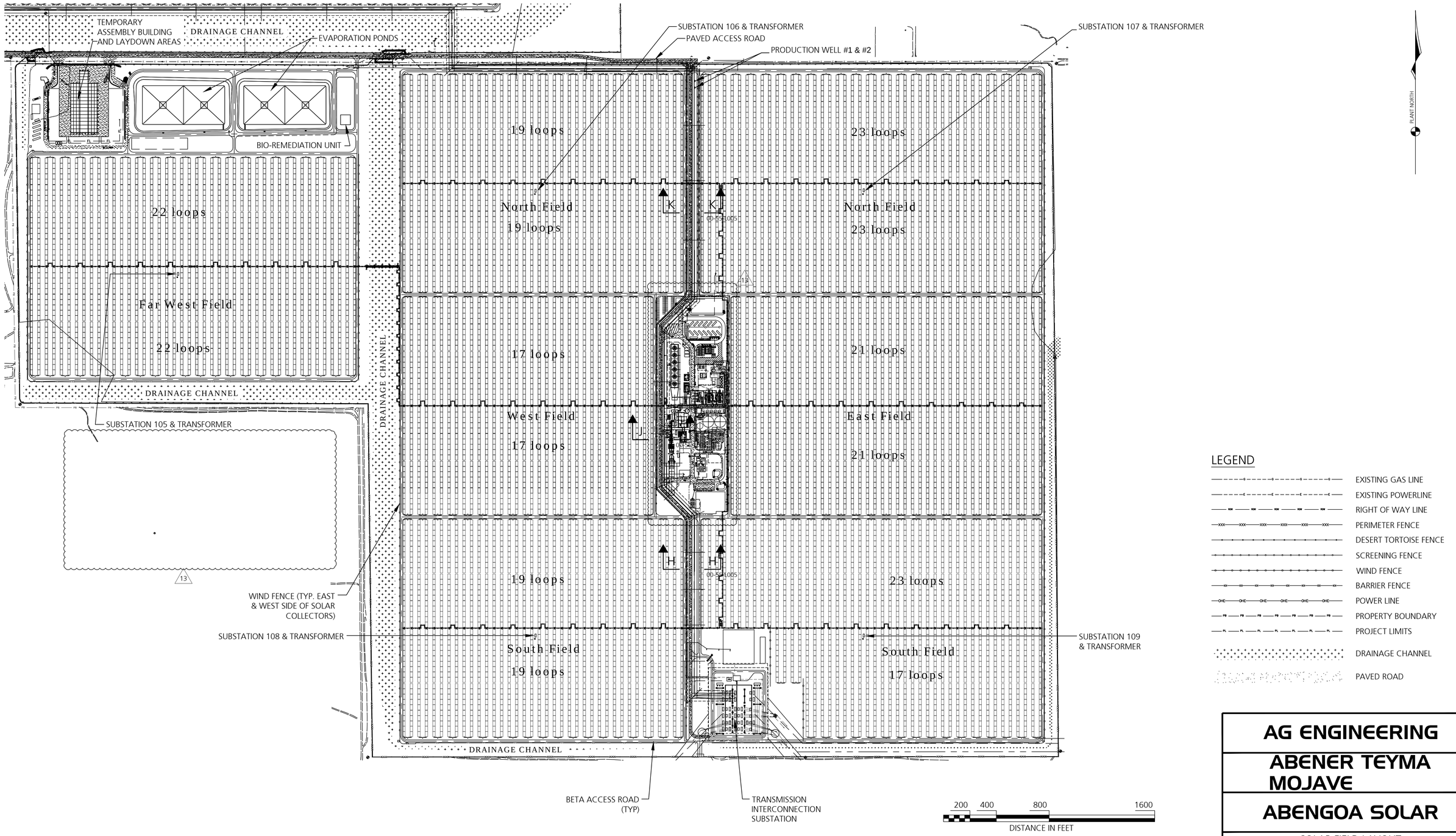
MOJAVE SOLAR, LLC — HINKLEY, CALIFORNIA

	BY	DATE	APP'D.	DATE	JOB NO.	REVISION
DRAWN	TEC	13JAN11	TS	13JAN11	120010	13
CHECKED	HD	13JAN11	DDC	13JAN11		
SCALE	1"=400'					

DRAWING NUMBER
6007-PLN-AGE-00-02-L001

Plot Date/Time/User: 7-Aug-13/6:25 PM/AGEEM

P:\PROJECTS\120010 MOJAVE SOLAR\AG ENGINEERING\ANTONIA CAD FILES\CIVIL\0. LAYOUT\08-07-13 LAYOUT_REV13\6007_PLN_AGE_00_02_L001.REV13.DWG



NO.	DATE	DESCRIPTION	BY	BY	BY
13	08/08/13	CHANGE POWER BLOCK	KCM	ABS	MZA
12	05/21/13	CHANGES IN POWER BLOCK	ABA	MMW	APF
11	04/22/13	CHANGES IN POWER BLOCK CLOSING IN HTF MAIN PIPE	ABA	MMW	
10	04DEC12	INCLUDED 230W LINE POWER BLOCK STRUCTURES UPDATED	ABA	MMW	
9	17OCT12	INCLUDED METEOROLOGICAL STATIONS REVISED WATER VALLEY SCE SUBSTATION	ABA	MMW	
		UPDATED CENTRAL PLANT LAYOUT AND PIPING INCLUDED STRUCTURES AND FOUNDATIONS ON SOLAR FIELD	ABA	MMW	
8	31AUG12	UPDATED CENTRAL PLANT LAYOUT	ABA	MMW	
7	30AUG12	ADDED PRODUCTION WELLS & E.SUBESTATIONS NEW DIMENSIONS AND LOCATIONS	OLG	MMW	
		REMOVED PROPERTY LINES			
6	05JUN12	REVISED MAINTENANCE ROAD RADII AS NEEDED UPDATED CENTRAL PLANT	MJS	DRD	MZA APF
		(NOT CLOUDED FOR CLARITY) REV LINETYPES	MJS	DRD	MZA APF
5	16MAR12	REV MIRROR ASSY PLANT AND THE BETA PLANT LAYOUT	MJS	DRD	MZA APF

REVISIONS | PE STAMP

08/08/13	FOR CONSTRUCTION
ISSUE DATE	PURPOSE OF ISSUE

AG ENGINEERING

ABENER TEYMA MOJAVE

ABENGOA SOLAR

SOLAR FIELD LAYOUT
FOR BETA PLANT

MOJAVE SOLAR, LLC — HINKLEY, CALIFORNIA

	BY	DATE	APP'D.	DATE	JOB NO.	REVISION
DRAWN	TEC	13JAN11	TS	13JAN11	120010	13
CHECKED	HD	13JAN11	DDC	13JAN11		
SCALE	1"=350'					

DRAWING NUMBER
6007-PLN-AGE-00-02-L002

Plot Date/Time/User: 7-Aug-13/6:08 PM/AGEEM

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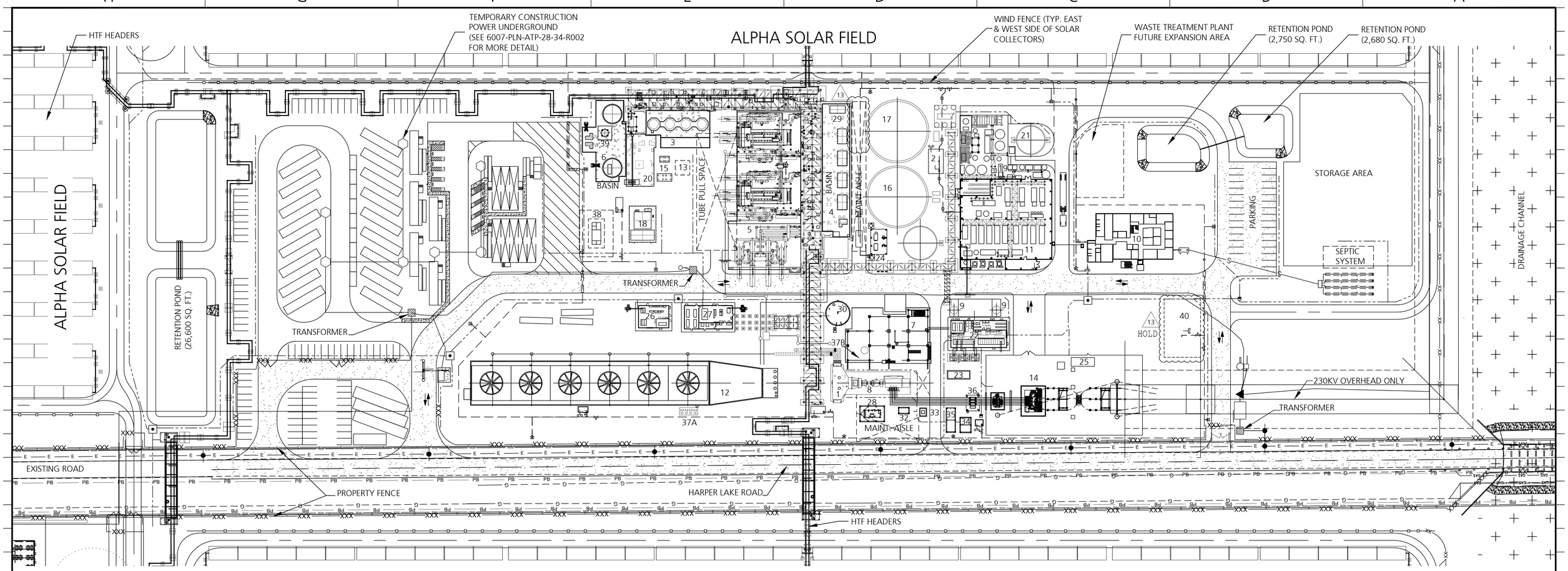

EQUIPMENT LIST					
NUMBER	TAG	DESCRIPTION	NUMBER	TAG	DESCRIPTION
1	A/B-MX-313	Condenser	21	A-MT-451	Polisher Feed Tank
2		Fire Protection System Building	22		Control Electrical Power room
3	A-MV-205A/B/C/E	HTF Expansion Vessels/HTF Expansion Flash Vessel	23		13 EM Diesel Generator
4	A-MP-200A/B/C/D A-MP-201	HTF Main and Recirculation Pumps	24		Compressed Air System
5		Solar Steam Generator 13	25		Substation Relay House
6	A-MT-204A/B	HTF Overflow Tanks and Overflow System	26		CT Electrical Building
7		Deaerator and Boiler Feedwater Zone	27		HTF Electrical Building
8	A-MG-301	Steam Turbine Generator	28		Lube Oil Skid
9		Raw Water Production Wells 13	29	A-MX-208/ A-MV-210	Electric Heater & Strainer Drain Vessel
10		Central E&C and Operation Building (Offices and Maint Shop)	30	A-MT-453	Polished Water Tank
11		Water Treatment Plant Area	31	A-MT-424	Cooling Tower Blowdown Tank
12	A-MM-401A/B/C/D/E/F	Cooling Tower	32		Excitation Compartment
13		Future regeneration system	33		Excitation Transformer
14		Switchyard	34		Battery Compartment
15	A-MF-206A/B/C/D	Carbon filters	35		PEECC-MKVI Interface Outline (GE main electrical building))
16	A-MT-444	Process Make-up Water Tank (Cooling Tower Make-up)	36		Circuit Breaker
17	A-MT-402	Raw/Fire Water Tank	37A/37B		Cooling Tower Chemical Feed System/Boiler Feetwater Chemical System (BFW)
18	A-MZ-207	Nitrogen System	38		Chemical products storage
19	A-MZ-455	Oil Water Separator	39	A-MV-206	HTF/Steam vessel
20		Ullage system	13 40		Warehouse / Workshop

LEGEND

- EXISTING GAS LINE
- NEW/RELOCATED GAS LINE
- EXISTING POWERLINE
- RIGHT OF WAY LINE
- PERIMETER FENCE
- DESERT TORTOISE FENCE
- SCREENING FENCE
- WIND FENCE
- BARRIER FENCE
- POWER LINE
- PROPERTY BOUNDARY
- PROJECT LIMITS
- DRAINAGE CHANNEL
- PAVED ROAD

PLANT NORTH

50 100 200 400

DISTANCE IN FEET

REVISIONS						
NO.	DATE	DESCRIPTION	BY	BY	BY
13	08/08/13	UPDATE MAINTENANCE AREA & WAREHOUSE / WORKSHOP	ECM	ABA	AJY
12	05/21/13	UPDATED CARBON FILTERS	ABA	MJMF	
11	04/22/13	NEW LAYOUT WTP/NEW BASIN (3,4,6,20) NEW LAYOUT POWER SUBSTATION (14)	ECM	ABA	
		UPDATED DUCKBANK, DELETE WAREHOUSE AND X-MX-206 EQUIPMENT NEW LAYOUT (13,24,26,27,29,33,34,35)			
10	04DEC12	WAREHOUSE NEW POSITION NEW ACCESS AND RETENTION POND	ABA	MJMF	
		UPDATED STRUCTURES RACK, DEAREATOR, LUBE OIL, NITROGEN AND WTP			
		HTF LOAD SPACE RESERVED UPDATED +230KV LINE, UNDERGROUND AND FIRE LINE			
9	17OCT12	UPDATED STRUCTURES & FOUNDATIONS ON POWER BLOCK REVISED PIPING	ABA	MJMF	
		MAINTENANCE & PB ROAD UPDATED NEW WTP LAYOUT			
		REVISED TEMPORARY CONSTRUCTION / POWER SUPPLY REVISED SUBSTATION & PERIMETER FENCE			
8	31AUG12	REV HTF PIPES LAYOUT UPDATED EQUIPMENT LIST	ABA	MJMF	
		REV ULLAGE AREA REV SUBSTATION			

PE STAMP

08/08/13	FOR CONSTRUCTION
ISSUE DATE	PURPOSE OF ISSUE

AG ENGINEERING

ABENER TEYMA MOJAVE

ABENGOA SOLAR

CENTRAL PLANT LAYOUT
ALPHA PLANT

MOJAVE SOLAR, LLC — HINKLEY, CALIFORNIA

	BY	DATE	APP'D.	DATE	JOB NO.	REVISION
DRAWN	TEC	13JAN11	TS	13JAN11	120010	13
CHECKED	HD	13JAN11	DDC	13JAN11		
SCALE	1"=65'					

DRAWING NUMBER
6007-PLN-AGE-00-02-L003

Plot Date/Time/User: 8-Aug-13/2:37 PM/AGEEM
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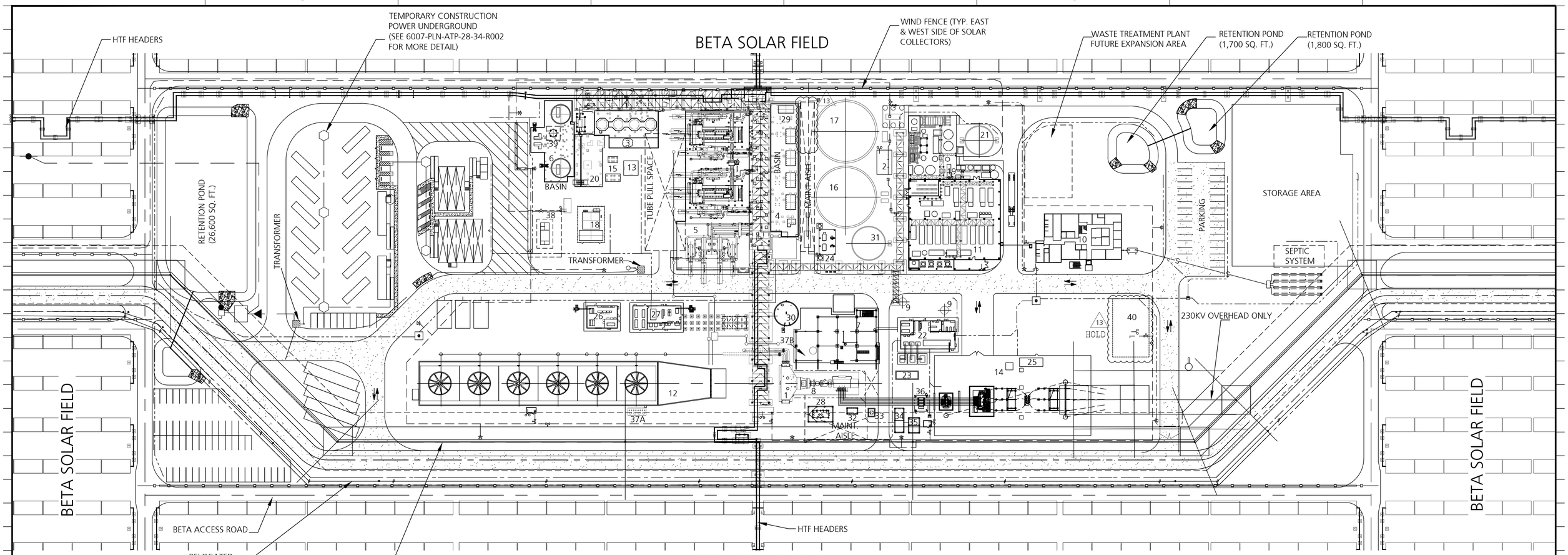

EQUIPMENT LIST					
NUMBER	TAG	DESCRIPTION	NUMBER	TAG	DESCRIPTION
1	B-MX-313	Condenser	21	B-MT-451	Polisher Feed Tank
2		Fire Protection System Building	22		Control Electrical Power room
3	B-MV-205A/B/C/E	HTF Expansion Vessels/HTF Expansion Flash Vessel	23	13	EM Diesel Generator
4	B-MP-200A/B/C/D A-MP-201	HTF Main and Recirculation Pumps	24		Compressed Air System
5		Solar Steam Generator 13	25		Substation Relay House
6	B-MT-204A/B	HTF Overflow Tanks and Overflow System	26		CT Electrical Building
7		Deaerator and Boiler Feedwater Zone	27		HTF Electrical Building
8	B-MG-301	Steam Turbine Generator	28		Lube Oil Skid
9		Raw Water Production Wells 13	29	B-MX-208/ B-MV-210	Electric Heater & Strainer Drain Vessel
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20		Ullage system	13 40		Warehouse / Workshop

LEGEND

- EXISTING GAS LINE
- EXISTING POWERLINE
- RIGHT OF WAY LINE
- PERIMETER FENCE
- DESERT TORTOISE FENCE
- SCREENING FENCE
- WIND FENCE
- BARRIER FENCE
- POWER LINE
- PROPERTY BOUNDARY
- PROJECT LIMITS
- DRAINAGE CHANNEL
- PAVED ROAD

PLANT NORTH

50 100 200 400
DISTANCE IN FEET

REVISIONS					
NO.	DATE	DESCRIPTION	BY	BY	BY
13	08/08/13	UPDATE MAINTENANCE AREA & WAREHOUSE / WORKSHOP	E.M. ABA	M.Z.A. AIP	
12	05/21/13	UPDATED CARBON FILTERS	ABA	MMP	
11	04/22/13	NEW LAYOUT WTP/NEW BASIN (3,4,6,20) NEW LAYOUT POWER SUBSTATION (14)	V.C.M.	ABA	
		UPDATED DUCKBANK, DELETE WAREHOUSE AND X-MX-206 EQUIPMENT NEW POSITION (3,13 26,27,29,33,34,35)			
10	04DEC12	WAREHOUSE NEW POSITION	ABA	MMP	
		UPDATED STRUCTURES RACK, DEAREATOR, LUBE OIL, NITROGEN AND WTP			
		HTF LOAD SPACE RESERVED UPDATED +230KV LINE			
9	17OCT12	UPDATED STRUCTURES & FOUNDATIONS ON POWER BLOCK	ABA	MMP	
		SCE TRANSMISION LINE 12KV REVISED TEMPORARY CONSTRUCTION / POWER SUPPLY			
		NEW WTP LAYOUT REVISED SUBDTATION & PIPING			
8	31AUG12	REV HTF PIPES LAYOUT UPDATED EQUIPMENT LIST	ABA	MMP	
		REV ULLAGE AREA REV SUBSTATION			

PE STAMP

08/08/13	FOR CONSTRUCTION
ISSUE DATE	PURPOSE OF ISSUE

AG ENGINEERING

ABENER TEYMA MOJAVE

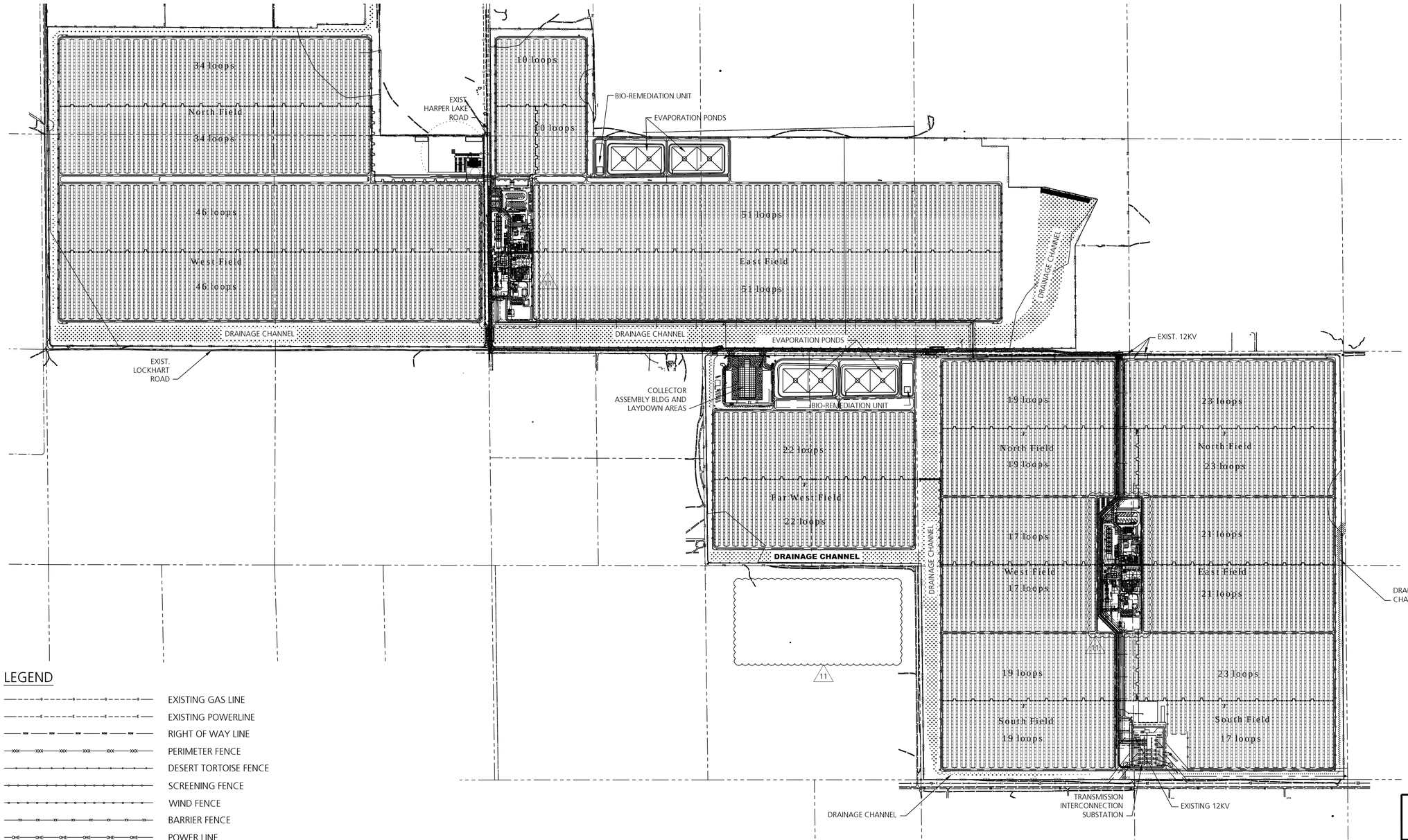
ABENGOA SOLAR

CENTRAL PLANT LAYOUT
BETA PLANT

MOJAVE SOLAR, LLC — HINKLEY, CALIFORNIA

	BY	DATE	APP'D.	DATE	JOB NO.	REVISION
DRAWN	TEC	13JAN11	TS	13JAN11	120010	13
CHECKED	HD	13JAN11	DDC	13JAN11		
SCALE	1"=65'					

DRAWING NUMBER
6007-PLN-AGE-00-02-L004



LEGEND

- EXISTING GAS LINE
- EXISTING POWERLINE
- RIGHT OF WAY LINE
- PERIMETER FENCE
- DESERT TORTOISE FENCE
- SCREENING FENCE
- WIND FENCE
- BARRIER FENCE
- POWER LINE
- PROPERTY BOUNDARY
- PROJECT LIMITS
- DRAINAGE CHANNEL
- PAVED ROAD
- SECTION LINE
- QUARTER SECTION LINE

0 500 1000 1500
DISTANCE IN FEET

REVISIONS NO.	DATE	DESCRIPTION	BY	BY	BY
11	08/08/13	CHANGE POWER BLOCK	ECM	ABA	MZA
10	05/21/13	CHANGES IN POWER BLOCK ALPHA & BETA	ABA	MMP	APF
9	04/22/13	CHANGES IN POWER BLOCK ALPHA & BETA CLOSING IN HTF MAIN PIPE	ABA	MMP	
8	04DEC12	UPDATED 230 KV LINE POWER BLOCK STRUCTUR UPDATED	ABA	MMP	
7	17OCT12	INCLUDED METEOROLOGICAL STATIONS REVISED WATER VALLEY SCE SUBSTATION	ABA	MMP	
		UPDATED CENTRAL PLANT LAYOUT AND PIPING INCLUDED STRUCTURES AND FOUNDATIONS ON SOLAR FIELD			
6	31AUG12	UPDATED CENTRAL PLANT LAYOUT	ABA	MMP	
5	13AGO12	EXISTING POWERLINE REMOVAL. NEW LOCATION ELECTRICAL BUILDINGS. UPDATED CPs LAYOUT	OLG	MMP	
4	05JUN12	ADDED SECTION LINE TO LEGEND, REV POWERLINE LINETYPE, REV MAINT ROAD RADII AS NEEDED	MJS	ERD	MZA APF
3	16MAR12	REV MIRROR ASSY PLANT, AND BOTH CENTRAL PLANT LAYOUTS	MJS	ERD	MZA APF
2	10FEB12	REVISED ROAD/GATES/FENCING IN ALPHA NORTH, REMOVED 'PROPOSED' FROM NOTATIONS	MJS	ERD	MZA APF
1	21DEC11	COMBINED SOLAR COLLECTOR ASSEMBLY BLDGS, UPDATED SOLAR FIELD & PONDS	MJS	VED	MZA APF

PE STAMP

ISSUE DATE	PURPOSE OF ISSUE
08/08/13	FOR CONSTRUCTION

AG ENGINEERING

ABENER TEYMA MOJAVE

ABENGOA SOLAR

SITE PLAN

MOJAVE SOLAR, LLC — HINKLEY, CALIFORNIA

	BY	DATE	APP'D.	DATE	JOB NO.	REVISION
DRAWN	TLF	15MAR11	DDC	15MAR11	120010	11
CHECKED	TS	15MAR11				
SCALE	1"=650'					

DRAWING NUMBER
6007-PLN-AGE-00-02-L010

Plot Date/Time/User: 7-Aug-13/6:11 PM/AGEEM

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ATTACHMENT 4
REVISED PETITION TO AMEND THE COMMISSION'S CERTIFICATION OF THE ABENGOA MOJAVE SOLAR PROJECT 09-AFC-5C

Emergency Generator Manufacturer Specifications

EMERGENCY GENERATOR MANUFACTURER SPECIFICATIONS

EXPECTED INTERNAL COMBUSTION ENGINE EMISSIONS

Liquid Fuel

Emergency Generator

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

# of Identical Engines: 2

Stack Data

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

input the mfg ACFM or calculate per Exhaust sheet)

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

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

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

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

Notes:

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

Page 2

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

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

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

Fire Pump Manufacturer Specifications

FIRE PUMP MANUFACTURER SPECIFICATIONS

EXPECTED INTERNAL COMBUSTION ENGINE EMISSIONS

Liquid Fuel

# of Identical Engines: 2

Emergency Fire Pump

Mfg:	Clarke Firepump w/ John Deere Engine	
Engine #:	JX6H-UFADNO	
kW:	460	*(J.Deere 1760rpm Emissions Data)*
BHP:	N/A	
RPM:	1760/2100	
Fuel:	#2 Diesel	
Fuel Use:	29.2	Gph (1)
FuelHHV:	139000	Btu/gal
mmbtu/hr:	4.06	HHV

Stack Data

Height:	20	Ft.	6.096 meters
Diameter:	0.6667	Ft.	0.2032 meters
Temp:	843	deg F	723.7 Kelvins
ACFM:	2725		39.66 m/s

input the mfg ACFM or calculate per Exhaust sheet)

Area:	0.349	Sq.Ft.
Velocity:	130	Ft/Sec
Max Daily Op Hrs:	1	
Max Annual Op Hrs:	52	

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

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

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

Notes:

1. fuel consumption based on manufacturer's data

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

Page 2

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

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

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

Documents Submitted To The Mojave Desert Air Quality Management District

ABENGOA SOLAR

Mojave Solar LLC

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

October 8, 2013

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

Re: Mojave Solar, LLC Permit Amendment

Dear Mr. Anderson:

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

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

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

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

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

The compact disk that contains the air quality modeling and health risk assessment input/output files associated with the modification will be submitted under separate

cover. If you need another modeling disk or another copy of the application, please let me know.

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

Sincerely,

Frederick Redell - PE
General Manager, Mojave Solar LLC
ABENGOA SOLAR
Mojave Solar LLC
Abengoa Solar - Lakewood - Denver – USA
11500 West 13th Avenue
Lakewood, CO 80215
Phone: +13033239152 (86062) Cell: +13035135376 Fax: +13032332738
frederick.redell@solar.abengoa.com www.abengoa.com

Mojave Desert Air Quality Management District
14306 Park Avenue, Victorville, CA 92392-2310
760.245.1661 • FAX 760.245.2022

REQUEST TO CANCEL A PERMIT (ATC or PTO)

PERMIT ISSUED TO: Mojave Solar LLC

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

OWNER OR OPERATOR (DISTRICT COMPANY NUMBER): 1876

EQUIPMENT LOCATION (DISTRICT FACILITY NUMBER): 03130

PERMIT NUMBER(S) TO CANCEL: B011040, B011041

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

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

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

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

Signature, responsible member of organization

General Manager
Title

Frederick Redell
Printed Name

303-513-5376
Telephone No.

10/15/2013
Date

MDAQMD USE ONLY

Signature of Engineering Supervisor

Date

md_request_to_cancel_permit_rev3.doc

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

APPLICATION FOR AUTHORITY TO CONSTRUCT AND PERMIT TO OPERATE

Page 1 of 2: please type or print

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

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

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

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

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

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

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

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

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

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

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

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

11. Facility Annual Throughput by Quarters (percent):
25 % Jan-Mar | 25 % Apr-Jun | 25 % Jul-Sep | 25 % Oct-Dec

12. Expected Facility Operating Hours:
24 Hrs/Day | 7 Days/Wk | 52 Wks/Yr | 8760 Total Hrs/Yr

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

14. Signature of Responsible Official:
Official Title: General Manager

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

- For District Use Only -

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

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
GENERAL APPLICATION, continued

15. Stack Emissions Information:

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

(list additional stacks on a separate sheet)

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

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

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

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

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APPLICATION FOR AUTHORITY TO CONSTRUCT AND PERMIT TO OPERATE

Page 1 of 2: please type or print

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

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

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

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

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

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

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

11. Facility Annual Throughput by Quarters (percent):				12. Expected Facility Operating Hours:			
25 %	25 %	25 %	25 %	24	7	52	8760
Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Hrs/Day	Days/Wk	Wks/Yr	Total Hrs/Yr

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

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

- For District Use Only -

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

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
GENERAL APPLICATION, continued

15. Stack Emissions Information:

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

(list additional stacks on a separate sheet)

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

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

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

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

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Eldon Heaston
Executive Director

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

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

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

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

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

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

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

10. General Nature of Business: Electrical power production	11. Principal Product: Electricity
12. Facility Annual Throughput by Quarters (percent): 25 % Jan-Mar; 25 % Apr-Jun; 25 % Jul-Sep; 25 % Oct-Dec	13. Expected Operating Hours of IC Engine: 0.5 Hrs/Day; 1 Days/Wk; 52 Wks/Yr; 52 Total Hrs/Yr

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

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

- For District Use Only -

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

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

16. INFORMATION ON I.C.E.:

Manufacturer: MTU Friedrichshafen (Electro Molins)

Model No.: 16V4000G43 25 Serial No.:

Number of Cylinders: 16 Year of Manufacture: ~2013

Rating: 2280 Kw BHP Speed: ~1800 RPM

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

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

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

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

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

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

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

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

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

Direct Injected? [ ] After Cooled? [25]

Turbo Charged? [X] Inter Cooled? [25]

Timing Retarded? [ ] Other - Please specify: see data sheet attached

17. EMISSION RATES:

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

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

If yes: Manufacturer: Model No.:

Serial No.: *CARB EO#:

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

Other - Please specify:

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

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

Other - Please specify: see data sheet attached

Manufacturer:

Model No.: Serial No.:

Type, Size or Rating:

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Eldon Heaston
Executive Director

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

Page 1 of 2: please type or print

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

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

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

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

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

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

10. General Nature of Business: Electrical power production	11. Principal Product: Electricity
12. Facility Annual Throughput by Quarters (percent): 25 % Jan-Mar; 25 % Apr-Jun; 25 % Jul-Sep; 25 % Oct-Dec	13. Expected Operating Hours of IC Engine: 0.5 Hrs/Day; 1 Days/Wk; 52 Wks/Yr; 52 Total Hrs/Yr

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

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

- For District Use Only -

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

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

16. INFORMATION ON I.C.E.:

Manufacturer: MTU Friedrichshafen (Electro Molins)

Model No.: 16V4000G43 25 Serial No.:

Number of Cylinders: 16 Year of Manufacture: ~2013

Rating: 2280 Kw BHP Speed: ~1800 RPM

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

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

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

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

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

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

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

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

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

Direct Injected? [ ] After Cooled? [25]

Turbo Charged? [X] Inter Cooled? [25]

Timing Retarded? [ ] Other - Please specify:

17. EMISSION RATES:

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

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

If yes: Manufacturer: Model No.:

Serial No.: *CARB EO#:

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

Other - Please specify:

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

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

Other - Please specify:

Manufacturer:

Model No.: Serial No.:

Type, Size or Rating:

MOJAVE DESERT AIR QUALITY MANAGEMENT DISTRICT
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Eldon Heaston
Executive Director

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

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

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

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

7. Application is for: ☐ New Construction ☒ Modification* ☐ Change of Owner* — For modification or change of owner: *Current Permit Number: E011044

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

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

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

12. Facility Annual Throughput by Quarters (percent):				13. Expected Operating Hours of IC Engine:			
25 % Jan-Mar	25 % Apr-Jun	25 % Jul-Sep	25 % Oct-Dec	0.5 Hrs/Day	1 Days/Wk	52 Wks/Yr	52 Total Hrs/Yr

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

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

- For District Use Only -

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

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

16. INFORMATION ON I.C.E.:

Manufacturer: Clarke

Model No.: UFAD88 25 Serial No.:

Number of Cylinders: 6 Year of Manufacture: ~2013

Rating: 542-617 BHP Speed: ~1760 RPM

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

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

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

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

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

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

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

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

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

Direct Injected? [ ] After Cooled? [25]

Turbo Charged? [x] Inter Cooled? [25]

Timing Retarded? [ ] Other - Please specify: see data sheet attached

17. EMISSION RATES:

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

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

If yes: Manufacturer: Model No.:

Serial No.: *CARB EO#:

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

Other - Please specify:

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

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

Other - Please specify: see data sheet attached

Manufacturer:

Model No.: Serial No.:

Type, Size or Rating:

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

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

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

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

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

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

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

12. Facility Annual Throughput by Quarters (percent):

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

13. Expected Operating Hours of IC Engine:

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

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

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

- For District Use Only -

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

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

16. INFORMATION ON I.C.E.:

Manufacturer: Clarke

Model No.: UFAD88 25 Serial No.:

Number of Cylinders: 6 Year of Manufacture: ~2013

Rating: 542-617 BHP Speed: ~1760 RPM

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

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

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

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

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

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

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

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

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

Direct Injected? [ ] After Cooled? [25]

Turbo Charged? [X] Inter Cooled? [25]

Timing Retarded? [ ] Other - Please specify: see data sheet attached

17. EMISSION RATES:

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

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

If yes: Manufacturer: Model No.:

Serial No.: *CARB EO#:

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

Other - Please specify:

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

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

Other - Please specify: see data sheet attached

Manufacturer:

Model No.: Serial No.:

Type, Size or Rating:

Mojave Solar Project Permit Amendment

October 2013

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

In summary, the proposed changes include:

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

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

Current Project (Licensed)

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

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

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

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

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

Mojave Solar Project Permit Amendment

October 2013

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

In summary, the proposed changes include:

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

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

Current Project (Licensed)

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

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

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

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

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

SOx – 15 ppm S diesel fuel

Gasoline Storage/Dispensing System

VOC – Phase I/Phase II VAREC

NOx, SOx, CO, PM – n/a

Amendment – Revised Facility/Process Modifications

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

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

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

Nitrogen Venting of the HTF System

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

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

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

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

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

control/recovery efficiency of 99%. Thus, the originally proposed system meets or exceeds current BACT control efficiency levels.

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

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

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

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

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

Emissions Summary

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

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

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

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

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

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

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

Removal of the 21.5 MMBTU/hr Auxiliary Boilers

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

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

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

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

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

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

Attachment 3 contains the new fire pump engine specification sheets.

Modify the Cooling Towers to Incorporate a Change in Manufacturer

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

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

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

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

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

+Increases -Decreases	-1.1	-1.12	-2.27	-0.028	-0.31
CO2e emissions remain well below the PSD Tailoring rule limit for new sources, i.e., <100,000 tpy.					

Affected Environment (Revised)

Project Location

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

Climate and Meteorology

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

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

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

During the summer, the MDAB is generally influenced by a Pacific Subtropical High cell that sits off the coast, inhibiting cloud formation and encouraging daytime solar heating. The MDAB is rarely influenced by cold air masses moving south from Canada and Alaska, as these frontal

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

Table 9 State and Federal Ambient Air Quality Standards

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

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

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

Table 10 MDAQMD Attainment Status Table

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

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

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

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

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

Pollutant and Averaging Time	**Background Value, µg/m³**
PM_{10} – 24-hr	96/81
PM_{10} – Annual	21.5
$PM_{2.5}$ – 24-hr	16.0
$PM_{2.5}$ – Annual	8.2
CO – 1-hr	18209
CO – 8-hr	5955
NO_2 – 1-hr	275/135
NO_2 – Annual	32.0
SO_2 – 1-hr	136
SO_2 – 3-hr	136
SO_2 – 24-hr	18.4

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

downloaded from the National Oceanic and Atmospheric Administration Earth System Research Laboratory (NOAA/ESRL) website. All other AERMOD inputs from the original AERMET processing were retained.

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

Changes in Modeled Impacts

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

TABLE 13 MODELED STACK PARAMETERS AND EMISSION RATES

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

[a] Each emergency generator, firepump, and cooling tower cell. Cooling tower flow rates and temperatures represent winter conditions for 24-hour impacts (worst-case conditions) and average ambient conditions for annual impacts.

[b] For assessing compliance with 1-hour NAAQS, the Average Hourly Emission Rate (AER) equal to the annual emission rate was used for emergency equipment tested only intermittently consistent with the CAPCOA document.

TABLE 15 AIR QUALITY IMPACT SUMMARY FOR NORMAL OPERATING CONDITIONS FOR STATIONARY POINT AND MOBILE/FUGITIVE SOURCES

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

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

[b] PM2.5 "24-hr" impact is the maximum four-year average concentration of the 8th highest (98th percentile) annual 24-hour concentrations. PM2.5 "Annual" impacts are the maximum annual impact for the CAAQS assessment and the maximum four-year average of the annual average concentrations for the NAAQS assessment.

Revised Health Risk Evaluation

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

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

risks (for carcinogenic substances), or comparison with reference exposure levels for non-cancer health effects (for non-carcinogenic substances).

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

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

Characterization of Risks from Toxic Air Pollutants

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

the assumption is that humans are as sensitive as the most sensitive animal species. Therefore, the true risk is not likely to be higher than risks estimated using unit risk factors and is most likely lower, and could even be zero.

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

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

Operation Odors

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

Summary of Impacts

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

Revised Cumulative Impacts

The HRA for the Project indicates the maximum cancer risk will be approximately 6.77×10^{-7}, versus the MDAQMD significance threshold of >10 in one million at the point of maximum exposure to air toxics from power plant emissions utilizing TBACT. This risk level is considered

ATTACHMENT 1 – HTF ULLAGE SYSTEM PROCESS FLOW BLOCK DIAGRAM

(CONFIDENTIAL INFORMATION)

ATTACHMENT 2 – EMERGENCY GENERATOR MANUFACTURER SPECIFICATIONS

EXPECTED INTERNAL COMBUSTION ENGINE EMISSIONS

Liquid Fuel

# of Identical Engines: 2

Emergency Generator

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

Stack Data

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

input the mfg ACFM or calculate per Exhaust sheet)

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

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

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

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

Notes:

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

Page 2

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

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

ATTACHMENT 3 – FIRE PUMP MANUFACTURER SPECIFICATIONS

EXPECTED INTERNAL COMBUSTION ENGINE EMISSIONS

Liquid Fuel

# of Identical Engines: 2

Emergency Fire Pump

Mfg: Clarke Firepump w/ John Deere Engine
Engine #: JX6H-UFADNO
kW: 460 *(J.Deere 1760rpm Emissions Data)*
BHP: N/A
RPM: 1760/2100
Fuel: #2 Diesel
Fuel Use: 29.2 Gph (1)
FuelHHV: 139000 Btu/gal
mmbtu/hr: 4.06 HHV

Stack Data

Height:	20	Ft.	6.096 meters
Diameter:	0.6667	Ft.	0.2032 meters
Temp:	843	deg F	723.7 Kelvins
ACFM:	2725		39.66 m/s

input the mfg ACFM or calculate per Exhaust sheet)

Area:	0.349	Sq.Ft.
Velocity:	130	Ft/Sec
Max Daily Op Hrs:	1	
Max Annual Op Hrs:	52	

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

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

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

Notes:
1. fuel consumption based on manufacturer's data

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

Page 2
Max Daily Op Time: 0.5 hrs
Max Annual # Tests: 52

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