Appendix D

Air Quality Emissions Data

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EMISSION ANALYSIS FOR THE QUARTZSITE SOLAR ENERGY PROJECT

1.0 DRY-COOLED ALTERNATIVE

1.1 Construction Phase Air Emission Inventory

The emission inventory presented in this section addresses estimated construction activity emissions associated with development of the Applicant's Proposed Project - a dry-cooled solar facility.

1.1.1 Earthmoving Operations and Construction-Phase Vehicle Emissions

The maximum construction emission conditions were evaluated for the Project 12-month period with the highest planned number of vehicles and hours of operation for equipment on-site (Months 10 – 21). In addition the inventory considers the off-site travel of vehicles for salt and construction material deliveries, and commuter travel. The vehicle miles traveled per trip for these workers and deliveries are based on travel distances from Phoenix for on-road equipment delivery, and for commuters traveling from the vicinity of Quartzsite, as well as from Blythe, California and as far away as Yuma.

1.1.2 Aggregate Plant Operations and Emission Estimates

An onsite aggregate processing plant may be deployed relatively early in order to support the Project's need for aggregates (e.g. road compaction, dust minimization, material for batch plant). Alternatively, aggregates may be procured from a commercial source. Activities at the plant (onsite or offsite) would consist of quarrying, crushing, and screening for aggregates, pea gravel, and coarse rock and sand. Equipment and emission sources associated with the aggregate processing plant would generally consist of:

- A 350-tons per hour primary crusher, a primary screening system, and a baghouse controlling both pieces of equipment
- A 200-tons per hour secondary crusher and a secondary screening system

A tertiary screener would provide additional processing for the primary screened material. Operation of the aggregate plant would occupy approximately 9 months of the 30 month overall schedule. A conservative estimate of maximum hourly throughput may be based on a three month time window and on a 10-hour day, 5-day per week schedule: 350,000 tons / (10 x 90) = 388 tons/hour (approximately 410 tons per hour [maximum] for permitting purpose).

1.1.3 Concrete Batch Plant Operations and Emissions

A temporary concrete batch plant consisting of three portable units would be set up near the perimeter of the site to supply the necessary ready-mix concrete for the plant. Each of the units would be rated at 300 cubic yards/hour. Concrete requirements include foundations for the solar

collecting tower structure, the storage tanks, several building/structures and all the heliostats. Total concrete requirement for the Project is estimated to be 90,000 cubic yards or approximately 360,000 tons on a dry basis. Should the Project opt to receive pre-mixed concrete from off-site sources, this would be in lieu of deliveries of sand, aggregate and cement, so that delivery vehicle activity is nearly the same. However, the on-site emissions from the batch plant would be avoided.

For monolithic concrete such as the foundation of the solar collecting tower and the tower structure itself, continuous supply and pouring of concrete will be necessary. For purposes of estimating emissions for the on-site concrete batch plant option, it is conservatively assumed the on-site batching units will be operated up to 24 hours per day, 7 days per week. It is likely that one or two batching units will be removed from the Project area as soon as the production demand rate subsides.

Particulate matter less than 10 microns (PM_{10}), consisting primarily of cement dust and some aggregate and sand dust, is the primary pollutant from the cement plant. Point sources associated with the batch plant are the dust collectors for each batching unit. Fugitive sources include the transfer of sand and aggregate, and wind erosion from sand and aggregate storage piles. The amount of fugitive emissions generated during the transfer of sand and aggregate depends primarily on the surface moisture content of these materials.

Although the optional on-site batch plants would be capable of higher theoretical rates, the actual process rate will be constrained by the loading capacity of the concrete transfer trucks. It is estimated that no more than ten batches (12 cubic yard batch, six (6) minutes cycle each) can be charged by each unit per hour. The maximum hourly loading rates for cement and supplement loadings are based on the maximum capacity of the respective hoppers (approximately 65.5 cubic yards or 50 cubic meters) for each system.

1.1.4 Construction Phase Emission Summary

Due to the highly conservative assumptions involved, the actual construction phase emissions are expected to be significantly below the levels shown in Table 1-1.

Table 1-1 Maximum Annual Criteria Pollutant Emission Estimates for the Construction Phase

Emission Source Category[1]	**Maximum Construction 12-Month Emissions (tons/yr)**[1]				
	PM_{10}	**$PM_{2.5}$**	**NO_x**	**CO**	**VOC**
Plant and Linear Element Construction Activities (110 MW Plant)					
Earthmoving/Construction Operations - Plant [2]	45.5	9.5	–	–	–
Earthmoving/Construction Operations – Transmission Corridor [2]	7.3	1.5	–	–	–
Aggregate Processing Plant [3]	1.3	–	–	–	–
Concrete Batch Plant [3]	4.8	–	–	–	–

Table 1-1 Maximum Annual Criteria Pollutant Emission Estimates for the Construction Phase					
Emission Source Category[1]	**Maximum Construction 12-Month Emissions (tons/yr)[1]**				
	PM_{10}	**$PM_{2.5}$**	**NO_x**	**CO**	**VOC**
On-Site Vehicle/Construction Equip. Exhaust [4]	2.9	2.7	43.3	25.2	11.1
TOTAL ON-SITE EMISSIONS (Months 10-21, Peak Activity)	61.8	13.7	43.3	25.2	11.1
Indirect, Off-Site Vehicle Exhaust [5]	1.1	0.8	28.5	25.8	4.6
Worker commuting vehicles [6]	1.56	0.3	0.96	9.6	7.9

[1] Roster of equipment and activity on site based on the highest estimate 12-month period (Months 10-21) over the Project construction schedule. .

[2] Earthmoving activity estimates assume 50 acres of Project area and 8 acres of linear transmission corridors will be under active construction in a single day. Emission factors used for general heavy industry construction activity from URBEMIS Version 9.2.4 of 20 lbs PM_{10}/acre-day.

[3] Aggregate and concrete batch plant emission factors for fugitive and controlled point sources from EPA Document AP-42, Chapter 11. The inclusion of an on-site batch plant is a construction phase option that is included in the Proposed Action.

[4] Equipment categories include wheeled and tracked mobile construction equipment. Construction vehicle and equipment emission factors from South Coast Air Quality Management District for the CY 2012 equipment populations (South Coast Air Quality Management District 2008 as amended).

[5] Equipment categories include off-site mobile sources, supply deliveries, and vehicle travel for construction activities surrounding the site. On-road vehicle emission factors from South Coast Air Quality Management District for the CY 2012 equipment population (South Coast Air Quality Management District – 2007 emission factor database).

[6] Commuter vehicle emissions derived from URBEMIS Version 9.2.4. Rural Project area assumed 50 acres per day active construction, average 250 mile commute, seasonal temperatures adjusted for La Paz County.

1.1.5 Salt Commissioning Sources and Emission Inventory Methods

The salt commissioning activities will take place during the latter stages of the construction phase and will involve the melting, heating, and conditioning of approximately 70 million pounds of sodium nitrate and potassium nitrate salts. The process consists of salt melting and salt conditioning. Overall, the salt commissioning process is expected to take approximately 90 days and is planned to begin in month 18 of the construction schedule. The salt melting and conditioning heaters will utilize gaseous fuel (natural gas or propane).

The salt melting and heating processes will produce limited emissions of criteria and hazardous air pollutants resulting from the combustion of gaseous fuels in two temporary gas-fired convection heaters. The salt melter and conditioning heater units will have rated heat release capacities of 55 million and 20 million British thermal units per hour (MMBtu/hr), respectively. Propane was chosen for the analysis, as this would not require a fuel pipeline interconnect. Other alternative fuels are pipeline natural gas or liquefied natural gas. However, there is no pipeline connection proposed for the Project location and there is one potential liquefied natural gas truck terminal within a reasonable distance. The key process parameters that affect the air pollutant emissions from salt commissioning equipment are listed in Table 1-2.

Table 1-2 Operating Parameters for the Quartzsite Solar Energy Project Gas-fired Heater Equipment				
Unit	**Heat Input Rating (MMBTU/hr)**	**Horsepower or Other Rating**	**Hours of Operation at 100% Load[1]**	**Principal Emission Control[2]**
110 MW Plant				
Salt Melter Process Heater [3]	55	----	2,188	Low-nitrogen oxides (NO_X) Burners and Flue Gas Recirculation
Salt Conditioning Heater [3]	20	---	2,188	Low-NO_X Burners and Flue Gas Recirculation
Hot Salt Storage Tank Conditioning Vent [4]	NA	Approx 2,000 actual cubic feet per minute	2,188	Wet Scrubber[5]

[1] Annual hours of operation reflect anticipated hours anticipated during the salt commissioning phase and would occur once during the plant life.

[2] The principal means of add-on or design-based air pollution control to be utilized for the equipment, which will meet or exceed underlying regulatory requirements.

[3] Heat Input Rating and Annual Operating Hours for the Salt Melter and Salt Conditioning Heaters are the equivalent hours of full-load operation that equates to the anticipated salt commissioning phase. Actual operating hours per year may be higher because some portion of the gas-fired operation is expected to be at part-load conditions.

[4] Molten salt commissioning off-gas venting emissions occur due to reaction of trace amounts of magnesium nitrate in the salt mixture and are based on Project estimates for maximum design case.

[5] In the event that ultra-low magnesium impurity salts are not available, the release of NO_2 from the salt conditioning process will be controlled by a multi-stage chemical wet scrubber.

Criteria pollutant emissions have been estimated using the highest emission rates among the gaseous fuels considered. The NO_x emissions for the two heaters are estimated assuming the heaters are equipped with both ultra-low NO_x burners and flue gas recirculation. Proper combustion design and control practices will limit carbon monoxide (CO) and volatile organic compound (VOC) emissions. Use of low-sulfur propane, specified to contain no more than 15 grains sulfur per 100 standard cubic feet will control sulfur dioxide (SO_2) emissions. The estimated criteria pollutant emissions for this construction phase commissioning activity are summarized in Table 1-3.

Negligible fugitive particulate emissions will be generated during the handling of the solid salts because the solid salts will be handled in an indoor environment. Furthermore, the salts are strongly hydrophilic (high tendency to absorb moisture) so salt particles will tend to coalesce and not become airborne.

Salt conditioning will result in the release of nitrogen dioxides (NO_2) from the oxidation of magnesium nitrate impurity in the salt solution; this emission source is separate from the combustion emissions and from the heating process described above. The NO_2 estimates for the salt conditioning process assume all the magnesium nitrate impurity as guaranteed by the supplier for each salt oxidize completely and release entirely from the liquid solution. To further

reduce the potential emission from this process, the Project is in the process of identifying sources and methods to further reduce or eliminate the magnesium impurity in the salt.

In the event that ultra-low magnesium impurity salts are not available, the release of NO_2 from the salt conditioning process will be controlled by a multi-stage chemical wet scrubber. The Project may also consider other control options such as the use of selective catalytic reduction. The emission estimates and analysis are currently conducted on the basis of the multi-stage chemical wet scrubber for controlling NO_2 emissions.

Table 1-3 Non-Recurring Criteria Pollutant Emission Estimates for Salt System Commissioning Operations

Source or Activity	**Maximum Gas-fired Emissions with Controls[1] (tons/project)**						
	NO_x	**SO_2**	**CO**	**VOC**	**PM_{10}**	**$PM_{2.5}$**	**HAPs**
55 MMBtu Salt Melter	0.64	1.2	6.17	0.82	0.57	0.57	0.038
20 MMBtu Salt Conditioning Heater	0.093	0.18	0.89	0.12	0.083	0.083	0.00075
Salt Commissioning Off-Gassing [2] (Using wet scrubber technology)	8.95	--	--	--	--	--	--
Total Non-Recurring Salt Commissioning Emissions [3] (Tons for Entire Commissioning Period)	9.68	1.38	7.06	0.94	0.65	0.65	0.039

[1] Criteria pollutant emission factors obtained for EPA Document AP-42, Section 1.5 (July 2008). Hazardous Air Pollutant (HAP) Emissions are based on South Coast Air Quality Management District Toxic Air Contaminant emission factor database.

[2] Molten salt commissioning venting emissions occur due to reaction of trace amounts of magnesium nitrate in the salt mixture and are based on project estimates for maximum design case. These emissions may be eliminated if the project can utilize ultra-low magnesium impurity salts.

[3] The total non-recurring emission reflect the entirety of the salt commissioning activity, assumed to occupy approximately 90 days and up to 2,188 total operating hours.

1.1.6 Greenhouse Gas Emissions for Construction Phase

Estimation of construction phase greenhouse gas (GHG) emissions considered the direct tailpipe emissions from construction equipment, on-site vehicles, and commuter vehicles. The combustion of diesel and gasoline fuels will result in formation and release of CO_2, methane (CH_4) and N_2O. Project GHG emission estimates are presented for information purposes. As there are no established significance criteria, this analysis makes no conclusions regarding GHG emissions.

For GHG calculations from internal combustion, emissions factors have been published by the EPA/Climate Registry (2008) and by the California Climate Action Registry (2009). For the planned construction period with the highest population and activity of construction equipment (Months 10 – 21), Table 1-4 lists the mass emission rates for each GHG constituent in metric tons (MT).

The GHGs other than CO_2 have a higher Global Warming Potential due to their molecular structure. This factor is accounted for when converting the raw ton/yr emission rates of the gases to the metric tons of carbon dioxide equivalent per year (CO_{2eq}/yr). For combustion-related species CH_4 and N_2O the Global Warming Potentials are 21 and 310, respectively, relative to CO_2. The resulting carbon equivalent GHG intensity for each constituent is reflected in the metric tons of carbon equivalent (CO_{2eq}/yr) shown in Table 1-4.

Table 1-4 Greenhouse Gas Emissions for the Construction Phase

Source or Activity	**GHG Emission Rates – Peak Activity 12-Month Period[1]**						
	CO_2	**CH_4**	**N_2O**	**CO_2**	**CH_4**	**N_2O**	
	Metric tons / yr			**As metric tons CO_{2eq} / yr**			**Total metric tons CO_{2eq} / yr**
On-Site Vehicle/Construction Equipment Exhaust [2]	4,153	3.9	0.11	4,153	81.9	33.4	4,268
55 MMBtu Salt Melter [3]	9,480	0.15	0.02	9,480	3.15	6.2	9,489
20 MMBtu Salt Conditioning Heater [3]	63.0	0.02	0.002	63.0	0.42	0.62	64
ON-SITE CONSTRUCTION GHG EMISSIONS				13,696	86	40	13,822
Indirect, Off-Site Vehicle Exhaust [4]	3,003	0.17	0.077	3,003	3.6	23.8	3,308
Worker Commuting Vehicles [5]	9,180	0.27	0.14	9,180	5.7	42.1	9,228
OFF-SITE CONSTRUCTION GHG EMISSIONS				12,183	9.3	66	12,258

[1] The period with highest overall construction vehicle population and miles traveled is anticipated to be month 10-21.

[2] Category includes earthmoving equipment, stationary on-site equipment, and non-road construction vehicles. Emissions of GHG derived from emission factors published by the EPA/Climate Registry (2008) and California Climate Action Registry (2009).

[3] For gaseous fuel use, heater GHG emission factors from CARB Mandatory Reporting of GHG Emission (17 CCR Sec 95100-95133).

[4] Category construction related vehicles that may be on-road or off-road (e.g., contractor vehicles and delivery vehicles). Emissions of GHG derived from emission factors published by the EPA/Climate Registry (2008) and California Climate Action Registry (2009).

[4] Commuter vehicles GHG emission from URBEMIS Version 9.2.4 for the CO_2 and ratios for CH_4 and N_2O emissions were derived from California Climate Action Registry (2009) analysis for commuter vehicles for the operational phase of the Project.

1.2 Dry-Cooled Alternative - Operational Phase Air Emission Sources

During the operational phase of the Project there will be no routine air pollutant emissions associated with generation of electricity. The key parameters for each emission source category for the operational phase are summarized in Table 1-5.

Table 1-5 Operating Parameters Operational Phase Emission Source Equipment				
Unit	**Process Flow (gpm)**	**Horsepower**	**Annual Hours of Operation[1]**	**Principal Emission Control[2]**
100 MW Plant				
Plant Cooling Tower – Dry Cooling Option	Not Applicable		5,000	Negligible Emissions
Diesel Engine-Driven Emergency Generators (2)	---	4,023 per engine	50 per engine	EPA Tier 2 Certification
Diesel Engine-Driven Fire Water Pumps (2)	---	600 per engine	50 per engine	EPA Tier 3 Certification

[1] Annual hours of operation reflect anticipated during representative operating year for the plant.

[2] The principal means of add-on or design-based air pollution control to be utilized for the equipment which will meet or exceed underlying regulatory requirements.

1.2.1 Emergency Diesel Generator and Fire Water Pump Engines

The primary function of the emergency generators will be to provide relatively instantaneous backup power needed to redirect the heliostat field flux off the solar receiver during loss of liquid salt flow emergencies. The emergency generators are approximately 4,000 brake-horsepower (bhp) each and will be test run at least monthly to meet supplier guarantee, the NFPA and insurance carrier requirements on maintenance and testing.

Emissions estimates of NO_x, CO, PM_{10}, $PM_{2.5}$, and SO_2 from the new diesel-powered emergency generators and emergency fire pumps were based 50 hours of annual operation, and use of engines meeting the EPA Tier II and Tier III emission standards, respectively. This limited schedule is more stringent than would be required by federal rules. New (post-2006 model year) compression-ignition engines of this type are limited by federal new source performance standards (40 CFR Part 60, Subpart IIII) to 100 hours per year run time for normal readiness testing and maintenance.

1.2.2 Plant Operation Vehicle Traffic and Worker Commute

During normal operations several types of maintenance vehicles will travel through the Project area. These primarily consist of administration/maintenance worker vehicles, heliostat washing trucks, and material delivery trucks. While not involving as many workers as the construction phase, indirect emissions from commuter vehicles are also addressed in this analysis. The operating schedule assumed for the air emissions analysis is that operational vehicles are used 7 days/week, while maintenance, delivery, and administration staff vehicles are in use on-site 5 days/week. Similar to the construction phase emission estimates for working commuting vehicles, the on-road emissions from daily worker commute were estimated using the URBEMIS Version 9.2.4 program, with the default vehicle population profile, and travel mileages and ambient temperatures adjusted to reflect conditions for the Project locale.

1.2.3 Operational Phase Emission Inventory

Operational phase annual emission rate estimates are based on the maximum annual operating schedules for the Project equipment. The summary of annual emissions of criteria pollutants for the operational phase is shown in Table 1-6.

Table 1-6 Operational Phase Criteria Pollutant Emission Estimates

Source or Activity	Maximum Annual Emissions with Controls[1] (lbs/project)						
	NO_x	SO_2	CO	VOC	PM_{10}	$PM_{2.5}$	HAPs
Plant Cooling Tower – Dry Cooling Option [2]	---	---	---	---	Negl.	Negl.	---
Diesel Engine-Driven Emergency Generators (2 units) [3]	2,348	2.3	190	46	13.8	13.8	21.6
Diesel Engine-Driven Fire Water Pumps (2 units) [3]	198	0.3	38.4	3.1	7.3	7.3	6.3
Plant Operational, Maintenance, Heliostat Washing Vehicles and Deliveries [4]	3,045	9	3,298	330	10,691	1,251	---
Worker Commute Vehicles [5]	312	5	2,873	73	426	128	---
Total Annual Operational Phase Emissions:							
Dry Cooling Option	5,903	17	6,399	452	11,138	1,400	28

[1] Controlled emissions based on the design and operating parameters in Table 4.10. The total annual emissions reflect a representative year of full plant operations. Generating plant to operate 5,000 hr/yr and 2,500 hr/yr for hybrid cooling. Emergency engines operate less than 50 hr/yr for readiness and testing/maintenance

[2] There are negligible emissions from dry cooling. The process involves ambient airflow across the dry surfaces of fin-tube heat exchanger banks.

[3] Emergency engines operate for less than one hour, on average, per week, for readiness testing and maintenance.

[4] Criteria pollutant emission factors obtained from candidate vendor estimates that are compliant with Tier II and Tier III internal combustion engine standards, and using ultra-low sulfur (<15 ppm sulfur) distillate no. 2 fuel. HAP emissions are based on 2001 Ventura County Air Pollution Control District emission factors.

[5] Worker commute vehicle calculations assume 5 day/week for operation and admin staff and 7 day/week for operation workers. Emissions and fuel economy data taken for 2005 or newer vehicles from EPA data.

For the dry-cooling option, air emissions are negligible and this option does not contribute to the Project emission inventory.

The emergency diesel engine emissions are based on 60 minutes of maintenance testing once every two weeks, and a total annual operation of 50 hours. The diesel driven fire pumps emissions are based on 30 minutes of weekly testing, and a total annual operation of 50 hours.

1.2.4 Operational Phase Greenhouse Gas Emissions

During plant operation, there will be no fuel combustion associated with the generation of electricity. This is a substantial advantage for the Project, as the carbon footprint per unit of generation is small. The operational phase stationary sources of GHGs, specifically CO_2, CH_4,

and N_2O are the emergency generator engines and fire water pump engines. This analysis has also included direct and indirect mobile GHG emissions sources, including on-site maintenance and operational vehicles and worker commute travel. The di-electric insulating gas used in the electrical switchyard equipment is sulfur hexafluoride, which is also a GHG constituent. However, the small volume of incidental leakage of this gas represents a negligible GHG contribution for the Project. Project GHG emission estimates are presented for information purposes. As there are no established significance criteria, this analysis makes no conclusions regarding GHG emissions. Table 1-7 lists estimated GHG emissions for the operational phase.

Table 1-7 Greenhouse Gas Emissions for the Operational Phase

Source or Activity	**GHG Emission Rates – Highest Anticipated Normal Operations 12-Month Period[1]**						
	CO_2	**CH_4**	**N_2O**	**CO_2**	**CH_4**	**N_2O**	
	MT / yr			**As MT CO_2e / yr**			**Total MT CO_2e / yr**
Diesel Engine-Driven Emergency Generators (2 units) [2]	216	0.17	0.034	216	3.6	10.5	230
Diesel Engine-Driven Fire Water Pumps (2 units) [2]	31.8	0.0013	0.00026	31.8	0.027	0.081	31.9
Plant Operational, Maintenance, Heliostat Washing Vehicles and Deliveries [3]	298	0.009	0.005	298	0.19	1.55	300
Worker Commute Vehicles [4]	338	0.01	0.005	338	0.21	1.55	340
Maximum Annual Operational Phase GHG Emissions	884	0.19	0.044	884	4.03	13.7	902

[1] Emissions of GHG derives for full-schedule operation of stationary and mobile sources associated with Project operations.

[2, 3] Fuel combustion GHG emission factors published by EPA/Climate Registry (2008) and California Climate Action Registry (2009).

[2] Category includes operation-related vehicles that may be on-road or off-road (e.g., maintenance, administration, heliostat washing vehicles and delivery vehicles).

[4] Commuter vehicles GHG emissions from URBEMIS Version 9.2.4 for the CO_2 and ratios for CH_4 and N_2O emissions derived from California Climate Action Registry (2009) analysis for commuter vehicles for the operational phase of the Project.

1.3 Summary of Project Air Emissions and Conformity Assessment

An overall summary of the Project air emissions during the construction and operational phases on the basis of highest 12-month period emission rates is provided in Table 1-8. These emission rates reflect the period of the highest planned construction activity (Months 10 – 21), and a representative, peak-operation year during the operational phase. Even with the conservative operating assumptions described for this equipment, the annual emissions are below both Prevention of Significant Deterioration and Title V major source thresholds (EPA 2008, 2010). As discussed in the following section, none of these emission rates present the likelihood of a significant impact with respect to air quality.

Table 1-8 Summary of Maximum Annual Project Criteria Emissions and Comparison with Conformity Thresholds					
Source or Activity	**Annual Maximum Emissions with Controls (tons/yr)**				
	NO_x	**SO_2**	**CO**	**VOC**	**PM_{10}**
Construction Phase Emissions					
On-Site Construction Emissions	43.3	< 1	25.2	11.1	61.8
Indirect Off-Site Emissions	28.5	< 1	25.8	4.6	1.1
Worker Commuting Vehicles	0.96	Negl.	9.6	7.9	1.6
Salt Commissioning Emissions	9.7	1.4	7.1	0.9	0.7
Total 12-Month Construction Phase	82.5	<3.4	67.7	24.5	65.2
Operational Phase Emissions					
Stationary Plant Equipment (Dry Cooling)	1.27	0.0012	0.10	0.025	0.01
On-Site Vehicle Emissions	1.52	0.0045	1.65	0.16	5.3
Employee Commuting Vehicles	0.16	0.0025	1.44	0.036	0.21
Total 12-Month Operational Phase	2.9	0.0082	3.2	0.22	5.5
Arizona Department of Environmental Quality (ADEQ) Permitting Significance DeMinimis	**40**	**40**	**100**	**40**	**15**
General Conformity Thresholds (tons/yr)	**100**	**100**	**100**	**100**	**100**
Project Conforms?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

Few of these criteria can be applied to the Project because the operational phase emission rates, which are the only emissions associated with the Project over the longer term, are far below both prevention of significant deterioration and similar significance thresholds for air quality impacts. This factor is recognized by ADEQ, in that an air quality permit is not generally required for new sources with criteria pollutant emissions that would be less than state permitting deminimis thresholds. However, certain types of sources, such as rotating machinery, may require a permit regardless of annual emission rate.

Consequently, it is reasonable to conclude that none of the significance criteria that pertain to the magnitude of criteria pollutant emissions, or to the modeled ambient concentration, increment consumption, or deposition effects, represent applicable significance criteria for the Project. Unlike conventional utility generation projects the proposed Project does not rely on combustion of fuels to produce electricity. The long-range significance criteria that usually arise for fuel combustion at generating facilities, namely visibility impacts, and pollutant concentration increases in Class I and Class II protected areas would not pertain to the Project.

The Project will not pose the possibility of causing or contributing to a violation of air quality standards, or result in a change in pollutant concentrations in a non-attainment area. Since the Project area is in a relatively undeveloped area of the state, it is outside the boundaries of the

non-attainment areas associated with metropolitan Phoenix and surrounding developed areas. In accordance with the second step of the conformity determination process, the Project would not cause or contribute to any adverse change in air quality in a non-attainment or maintenance area. On this basis, the Project is formally exempt from a federal General Conformity determination.

However, a reasonable indicator of Significance for the Project is comparison of maximum 12-month period emissions for the Project to the annual emission rate trigger thresholds for General Conformity Analysis. Because these thresholds are applicable to major sources of air pollution to be located in non-attainment areas, they provide a very conservative analysis tool to assess the Significance of the Project that will be located in an attainment/unclassifiable area.

The Clean Air Act General Conformity Requirements for the NEPA process provide the following conformity review steps:

1. Determine whether criteria pollutants or their precursors would be emitted from the Project;
2. Determine whether emissions of criteria pollutants or precursors would occur in a non-attainment or maintenance area;
3. Determine whether the Project is exempt from conformity determination; and,
4. Estimate emissions and compare to the threshold emissions, and the emissions inventory in the non-attainment or maintenance area.

As presented in the section, there are emissions of criteria pollutants and precursors associated with the construction and operation of the Project. The ADEQ has designated all of La Paz County as being either in attainment or unclassifiable, with respect to the NAAQS.

As a conservative measure of Project significance or in the unlikely event that the La Paz County locale is designated a non-attainment or maintenance area, Table 1-8 summarizes the emission estimates for the construction and operational phases of the Project, each on a maximum emission rate, 12-month basis. As discussed in the preceding sections, direct Project emissions during the operational phase relate to periodic operation of the emergency equipment and Project cooling towers. Indirect emission sources include employee vehicle commute and third-party trips to the facility. The magnitude of these emissions are far below both the General Conformity, and the ADEQ air permitting de minimis thresholds, and thus do not present a likelihood of significant impacts. The facility will need to have an ADEQ Class II (Minor Source) air permit due to the categories of sources present, regardless of estimated actual emissions.

The construction phase emission inventory reflects the greatest potential for localized effects on air quality. However, even based on the conservative assumptions in this analysis, maximum 12-month emissions for the Project construction do not exceed the thresholds for a General Conformity analysis. Therefore, the magnitude of the emissions would not present a likelihood of significant impacts. In addition, construction emissions are transient in nature, and will move through the Project area during construction. Project construction will occur at less-intense levels during most of the construction timeframe, compared to the 12-month period addressed in this

analysis. Consequently, air quality impacts that could occur due to construction would not affect the same location for a significant period of time.

2.0 Alternative 1- Hybrid-Cooled

It is reasonable to conclude that construction emissions will be nearly identical, within the conservative set of assumptions, for either of the Project cooling alternatives for the generation cycle (either dry cooling or a hybrid cooling system).

2.1 Operational Phase Sources

The key parameters for each emission source category for the operational phase are summarized Table 1-9. Of the two cooling options, only the hybrid cooling system would represent an air emission source. As discussed below, each option will have different air emission characteristics.

Table 1-9 Operating Parameters Operational Phase Emission Source Equipment

Unit	Process Flow (gpm)	Horsepower	Annual Hours of Operation[1]	Principal Emission Control[2]
100 MW Plant				
Plant Cooling Tower – Hybrid Option	36,691		2,500	Reduced flow and drift eliminators rated at 0.0005%
Diesel Engine-Driven Emergency Generators (2)	---	4,023 per engine	50 per engine	EPA Tier 2 Certification
Diesel Engine-Driven Fire Water Pumps (2)	---	600 per engine	50 per engine	EPA Tier 3 Certification

1 Annual hours of operation reflect anticipated during representative operation year for the plant.

2 The principal means of add-on or design-based air pollution control to be utilized for the equipment, which will meet or exceed underlying regulatory requirements.

2.1.1 Generation Cycle Cooling

The hybrid cooling system option consists of an air cooled condenser as well as a small water-cooled condenser. The water-cooled condenser will reject heat of condensation through a conventional cooling tower that cools the circulating water used in the power block to condense steam.

The hybrid cooling system option will be an emission source of fine particulate matter (PM_{10} and $PM_{2.5}$). Aerosol droplets that are released as plume drift from the water-cooled condenser tower will evaporate in the atmosphere, and the dissolved salts will precipitate to form fine particles. The operational phase inventory includes these cooling tower emissions for the hybrid cooling alternative. Based on current design estimates, the condenser cooling tower will have an approximate water circulation rate of 36,691 gpm for the hybrid case. The condenser cooling tower will be equipped with a mist elimination system rated at 0.0005% by weight efficiency. The PM_{10} and $PM_{2.5}$ emissions from the cooling tower were calculated based on the estimated

total dissolved solids concentration in the groundwater. From historical solar data, it is estimated that the Project will not be operated for more than 5,000 hours per year. For the hybrid case, the cooling tower will not be operated for more than 50 percent of the total operating hours.

2.1.2 Emergency Diesel Generator and Fire Water Pump Engines

Effects associated with the operation of the emergency diesel generator and fire water pump engines for a hybrid-cooled solar plant, would be the same as the dry-cooled alternative.

2.1.3 Plant Operation Vehicle Traffic and Worker Commute

Effects of plant operation vehicle traffic for a hybrid-cooled solar plant would be the same as the dry-cooled alternative.

2.2 Operational Phase Emission Inventory

Operational phase annual emission rate estimates are based on the maximum annual operating schedules for the Project equipment listed in Table 1-9. The summary of annual emissions of criteria pollutants for the operational phase is shown in Table 1-10.

Table 1-10 Operational Phase Criteria Pollutant Emission Estimates: Hybrid-Cooled

Source or Activity	Maximum Annual Emissions with Controls[1] (lbs/project)						
	NO_x	SO_2	CO	VOC	PM_{10}	$PM_{2.5}$	HAPs
Plant Cooling Tower – Hybrid Cooling System [2]	---	---	---	---	1,780	1,780	---
Diesel Engine-Driven Emergency Generators (2 units) [3]	2,348	2.3	190	46	13.8	13.8	21.6
Diesel Engine-Driven Fire Water Pumps (2 units) [3]	198	0.3	38.4	3.1	7.3	7.3	6.3
Plant Operational, Maintenance, Heliostat Washing Vehicles and Deliveries [4]	3,045	9	3,298	330	10,691	1,251	---
Worker Commute Vehicles [5]	312	5	2,873	73	426	128	---
Total Annual Operational Phase Emissions:							
Hybrid Cooling System Option	5,903	17	6,399	452	12,918	3,180	28

[1] The total annual emissions reflect a representative year of full plant operations. Generating plant to operate 5,000 hr/yr and 2,500 hr/yr for hybrid cooling. Emergency engines operate 50 hr/yr for readiness and testing/maintenance

[2] Particulate emissions based on 1,550 mg/L supply water, 5 cycles of concentration, drift rate 0.0005% of circulation rate, and cooling system operation for 50% of annual operating hours.

[3] Criteria pollutant emission factors obtained from candidate vendor estimates that are compliant with Tier II and Tier III internal combustion engine standards, and using ultra-low sulfur (<15 ppm sulfur) distillate no. 2 fuel. HAP emissions are based on 2001 Ventura County Air Pollution Control District emission factors.

Table 1-10 Operational Phase Criteria Pollutant Emission Estimates: Hybrid-Cooled	
Source or Activity	**Maximum Annual Emissions with Controls[1] (lbs/project)**
[4] Calculations include on-site road dust emissions and exhaust emissions for operation-related vehicles. Gaseous pollutant emission factors from 2007 emission factor database for calendar year 2013 vehicles. Fugitive dust on unpaved roads from EPA Document AP-42, Section 13.2.2 (11/2006). [5] Worker commute vehicle calculations assume 5 day/wk for operation and admin staff and 7 day/wk for operation workers. Emissions and fuel economy data taken for 2005 or newer vehicles from EPA data.	

For the hybrid cooling system option, aerosol drift release rate is based on the design water circulation rate in the water-cooled condenser tower of 36,691 gpm. The water-cooled condenser cooling tower will be equipped with a drift elimination system rated at 0.0005% by weight efficiency for either option. The PM_{10} and $PM_{2.5}$ emissions from the hybrid system cooling tower were calculated based on the estimated total dissolved solids concentration in the groundwater. From historical solar data, it is estimated that the Project will not be operated for more than 5,000 hours per year. For the hybrid case, the cooling tower will operate for up to 50% of the total generation plant operating hours.

The emergency diesel engine emissions are based on 60 minutes of maintenance testing once every two weeks, and a total annual operation of 50 hours. The diesel driven fire pumps emissions are based on 30 minutes of weekly testing, and a total annual operation of 50 hours.

2.3 Summary of Project Air Emissions and Conformity Assessment

The summary and conclusions of air emissions would be essentially the same as the dry-cooled option. The only difference would be the emissions for the cooling tower as shown in Table 1-11. For the hybrid-cooling alternative the generation cooling system would contribute less than one-ton of particulate emissions per year.

Table 1-11 Summary of Maximum Annual Project Criteria Emissions and Comparison with Conformity Thresholds: Hybrid-Cooled

Source or Activity	**Annual Maximum Emissions with Controls (tons/yr)**				
	NO_x	**SO_2**	**CO**	**VOC**	**PM_{10}**
Construction Phase Emissions					
On-Site Construction Emissions	43.3	< 1	25.2	11.1	61.8
Indirect Off-Site Emissions	28.5	< 1	25.8	4.6	1.1
Worker Commuting Vehicles	0.96	Negl.	9.6	7.9	1.6
Salt Commissioning Emissions	9.7	1.4	7.1	0.9	0.7
Total 12-Month Construction Phase	82.5	<3.4	67.7	24.5	65.2

Table 1-11 Summary of Maximum Annual Project Criteria Emissions and Comparison with Conformity Thresholds: Hybrid-Cooled					
Source or Activity	**Annual Maximum Emissions with Controls (tons/yr)**				
	NO_x	**SO_2**	**CO**	**VOC**	**PM_{10}**
Operational Phase Emissions					
Stationary Plant Equipment (Dry Cooling)	1.27	0.0012	0.10	0.025	0.90
On-Site Vehicle Emissions	1.52	0.0045	1.65	0.16	5.3
Employee Commuting Vehicles	0.16	0.0025	1.44	0.036	0.21
Total 12-Month Operational Phase	2.9	0.0082	3.2	0.22	6.4
ADEQ Permitting Significance DeMinimis	**40**	**40**	**100**	**40**	**15**
General Conformity Thresholds (tons/yr)	**100**	**100**	**100**	**100**	**100**
Project Conforms?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**

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