CALIFORNIA ENERGY COMMISSION
1516 NINTH STREET
SACRAMENTO, CA 95814-5512
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California Energy Commission
DOCKETED
07-AFC-5C
TN # 68959
DEC 21 2012

DATE: December 21, 2012

TO: Interested Parties

FROM: Joseph Douglas, Compliance Project Manager

SUBJECT: Ivanpah Solar Generating System (07-AFC-5C)
Staff Analysis of Proposed Modifications to Air Quality Conditions

On March 8, 2012, Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC, filed a petition with the California Energy Commission (Energy Commission) to amend the Energy Commission Decision for the Ivanpah Solar Electric Generating System (ISEGS). The petition was docketed and posted to the Energy Commission website on March 8, 2012. Staff has prepared an analysis of this proposed change and a copy is enclosed for your information and review.

Ivanpah Solar Generating System (ISEGS) is a 370-megawatt project that was certified by the Energy Commission on September 22, 2010. It is currently under construction and is 75 percent complete. The facility is located in the Mojave Desert, near the Nevada border, in San Bernardino County.

Energy Commission staff reviewed the petition and assessed the impacts of this proposal on environmental quality, and public health and safety, and proposes revisions to existing Conditions of Certification. The proposed modifications would allow the operation of the Ivanpah Solar Electric Generating System (ISEGS or project) to be more effective and efficient and to continue to comply with applicable federal, State and Mojave Desert Air Quality Management District (MDAQMD or District) air quality laws, ordinances, regulations and standards (LORS). With the proposed modifications, the ISEGS would not result in significant air quality-related impacts. It is staff's opinion that, with the implementation of revised and new conditions, the project will remain in compliance with applicable LORS and that the proposed modifications will not result in a significant adverse direct or cumulative impact to the environment (Title 20, California Code of Regulations, section 1769).

The amendment petition and staff's analysis have been posted on the Energy Commission's webpage at http://www.energy.ca.gov/sitingcases/Ivanpah/compliance/index.html. The Energy Commission's Order (if approved) will also be posted on the webpage. Energy Commission staff intends to recommend approval of the petition at the February 13, 2013 Business Meeting of the Energy Commission.

Agencies and members of the public who wish to provide written comments on the Amendment are asked to submit comments to the Energy Commission Dockets Unit no later than January 22, 2013. Please include the docket number (07-AFC-5C) in the subject line or first paragraph of your comments. Those submitting comments

electronically should provide them in either Microsoft Word format or as a Portable Document Format (PDF) to [docket@energy.ca.gov]. Please include your name or organization's name in the file name. Those preparing non-electronic written comments should mail or hand deliver them to:

California Energy Commission
Dockets Unit, MS-4
Docket No. 07-AFC-5C
1516 Ninth Street
Sacramento, CA 95814-5512

For further information on how to participate in this proceeding, please contact the Energy Commission Public Adviser's Office, at (916) 654-4489, or toll free in California at (800) 822-6228, or by e-mail at publicadviser@energy.ca.gov. News media inquiries should be directed to the Energy Commission Media Office at (916) 654-4989, or by e-mail at mediaoffice@energy.ca.gov.

If you have any comments or questions on the technical analysis, please contact Joseph Douglas, Compliance Project Manager, at (916) 653-4677, or by fax to (916) 654-3882, or via e-mail at: joseph.douglas@energy.ca.gov.

Enclosure
Mail List 7255

IVANPAH SOLAR GENERATING SYSTEM (07-AFC-5C)

Petition to Amend Final Commission Decision
Introduction and Summary
Prepared by: Joseph Douglas

INTRODUCTION AND SUMMARY

On March 8, 2012, Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC, filed a petition with the California Energy Commission to amend the California Energy Commission Decision requesting to modify, delete and add Conditions of Certification for the Ivanpah Solar Electric Generating System (ISEGS). The 370-megawatt project was certified by the Energy Commission on September 22, 2010. It is currently under construction and is 75 percent complete. The facility is located in the Mojave Desert, near the Nevada border, in San Bernardino County.

SUMMARY OF PETITION

The modifications proposed in the petition would include several equipment changes to make the project operations more effective and efficient. The project owners have requested changes to the Energy Commission's certification to accomplish the following:

- Provide additional operating flexibility for the auxiliary boilers by increasing the maximum allowable daily operation (without increasing allowable annual operation);
- Increase the nominal size of each of the three auxiliary boilers and move each auxiliary boiler approximately 30 feet from the location shown in the Application for Certification drawings;
- Add three natural gas-fired nighttime preservation boilers;
- Reduce the size of three power block emergency generators from 2,500 kilowatts to 1,500 kilowatts each;
- Add a 250-kilowatt diesel powered emergency engine and a 100-horsepower diesel fire pump engine in the common area; and,
- Supplement the auxiliary dry cooling system with a Wet Surface Air Cooler system for additional equipment cooling during hot weather.

STAFF ANALYSIS

Air Quality staff evaluated the expected air quality impacts from the modified project, and found that the proposed changes in the amendment would affect air pollution emissions from various sources at the three Ivanpah power units.

Based upon final design refinements, a small increase in the size and daily operating hours of the auxiliary boilers is required for efficient facility operation. This would result in a small increase in hourly emissions due to additional fuel use. The Mojave Desert Air

Quality Management District (MDAQMD or District) released FDOC Revision D (MDAQMD 2012a) on October 5, 2012, and FDOC Revision E (MDAQMD 2012b) on November 1, 2012 to incorporate the proposed changes in the project. The District's FDOC Revision D and Revision E concluded that the project owner's proposed emission levels would meet the District's Best Available Control Technology (BACT) requirements. Additionally, staff concluded that with the reduction in the solar field footprint and power block equipment design of Unit 3 associated with biological minimization measures, the facility-wide annual emissions would still be within the limits imposed by the Energy Commission Final Decision.

Water Quality Staff also reviewed the proposed modification and determined that the project-related water usage would increase by 18 acre-feet per year from 77 to 95. This additional use is still within the 100 acre-feet per year limit imposed in the California Energy Commission Final Decision.

Energy Commission staff finds that with the adoption of the attached revised and new air quality Conditions of Certification, the modified Ivanpah Solar Electric Generating System would comply with applicable federal, state and Mojave Desert Air Quality Management District air quality laws, ordinances, regulations and standards (LORS), and that the modified ISEGS would not result in significant air quality-related impacts.

Energy Commission technical staff also reviewed the petition to amend for potential environmental effects and consistency with applicable LORS from all technical areas. Staff has determined that the technical or environmental areas of biology, cultural resources, hazardous materials management, facility design, land use, noise and vibration, paleontological resources, public health, soil and water resources, traffic and transportation, transmission line safety and nuisance, transmission system engineering, visual resources, and waste management are either not affected by the proposed changes or the changes have no significant environmental impact in these areas, and no revisions or new conditions of certification are needed to ensure the project remains in compliance with all applicable LORS. Staff determines that Air Quality Conditions of Certification would be modified, deleted, or added to allow the project to remain in compliance with applicable federal, State and District LORS. Table 1 summarizes staff's review.

TABLE 1 - TECHNICAL AREAS REVIEWED

TECHNICAL AREAS REVIEWED	STAFF RESPONSE			New, Revised, or Removed Conditions of Certification Recommended
	Technical Area Not Affected	No Significant Environmental Impact*	Process As Amendment	
Air Quality			X	X
Biological Resources	X			
Cultural Resources	X			
Hazardous Materials Management	X			
Facility Design	X			
Land Use	X			
Noise and Vibration	X			
Paleontological Resources	X			
Public Health	X			
Soil and Water Resources		X		
Traffic and Transportation	X			
Transmission Line Safety & Nuisance	X			
Transmission System Engineering	X			
Visual Resources	X			
Waste Management	X			
Worker Safety & Fire Protection	X			

*There is no possibility that the modifications may have a significant effect on the environment and the modification will not result in a change or deletion of a condition adopted by the commission in the final decision or make changes that would cause the project not to comply with any applicable laws, ordinances, regulations, or standards (LORS) (20 Cal. Code Regs., § 1769 (a)(2)).

IVANPAH SOLAR ELECTRIC GENERATING SYSTEM (07-AFC-05C)

Petition to Amend No.1

Wenjun Qian, Ph.D.

SUMMARY OF CONCLUSIONS

Staff finds that with the adoption of the attached Conditions of Certification, the Ivanpah Solar Electric Generating System (ISEGS or project) would comply with applicable federal, state and Mojave Desert Air Quality Management District (MDAQMD or District) air quality laws, ordinances, regulations and standards (LORS), and that the ISEGS would not result in significant air quality-related impacts.

INTRODUCTION

On March 8, 2012, the California Energy Commission (Energy Commission) received an amendment petition from Solar Partners I, LLC, Solar Partners II, LLC, and Solar Partners VIII, LLC (Solar Partners or project owner) to modify the certification for Ivanpah Solar Electric Generating System (ISEGS or project) (07-AFC-05C). The project was originally certified by the Energy Commission on September 22, 2010 (CEC 2010b) as three units that would generate a total of 370 megawatts (MW). Project construction commenced and is still underway. The project owner reviewed the project design and proposes to make several minor changes to the original project description that would be beneficial to efficient and effective operation of the project. The amendment request would:

- Provide additional operating flexibility for the three auxiliary boilers (one for each unit) by increasing the maximum allowable daily hours of operation (without increasing allowable annual hours of operation);
- Increase the nominal size of each of the three auxiliary boilers from 231.1 MMBtu/hr to 249 MMBtu/hr;
- Move each auxiliary boiler approximately 30 feet from the location shown in AFC drawings;
- Add three small natural gas-fired nighttime preservation boilers (one for each unit, no larger than 10 MMBtu/hr each);
- Reduce the size of three emergency generators (one for each unit) from 2,500 kilowatts (kW) each to 1,500 kW each;
- Add a 250 kW diesel fired emergency engine in the common area;
- Add a 106.5 horsepower (hp) diesel fire pump engine in the common area; and
- Replace auxiliary dry cooling systems with wet surface air condenser.

In this analysis, staff evaluated the expected air quality impacts from the modified project.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS) COMPLIANCE

The Commission Decision certifying the ISEGS project concluded that the project would be in compliance with all applicable laws, ordinances, regulations and standards (LORS). The project, as modified, is subject to all the applicable LORS in the October 2009 Final Staff Assessment (FSA) (CEC 2009).

At the time of the Commission Decision, the auxiliary boilers were exempt from the District's Best Available Control Technology (BACT) requirements (Rule 1303(A)) because the planned fuel use would result in emissions less than the BACT trigger level. The project owner's request to increase the daily fuel use would now increase the emissions and trigger BACT for NOx, VOC, and PM10 emissions for each auxiliary boiler.

The approved and proposed emergency diesel engines are subject to District Rule 475 - Electric Power Generating Equipment (NOx limit of 160 ppmv, firing on liquid fuel; PM limit not to exceed 0.01 gr/dscf @ 3 percent O_2 and 5 kg/hour).

The proposed 249 MMBtu/hr auxiliary boilers are subject to District Rule 476 – Steam Generating Equipment (NOx limit of 125 ppm when operated on gaseous fuel).

SETTING

Since the October 2009 FSA, the implementation of new federal Ambient Air Quality Standards (AAQS) has led to changes in the categorization of air quality in the ISEGS project area. A new 1-hour nitrogen dioxide (NO_2) National Ambient Air Quality Standard (NAAQS) became effective on April 12, 2010. In addition, a new 1-hour SO_2 NAAQS was established and the existing 24-hour and annual NAAQS were revoked on June 2, 2010.

The currently-applicable state and federal ambient air quality standards are listed in **Air Quality Table 1**. As indicated in this table, the averaging times for the various standards (the duration over which they are measured) range from hourly to annually. The standards are read as a concentration, in parts per million (ppm) or parts per billion (ppb), or as a weighted mass of material per volume of air, in milligrams or micrograms of pollutant per cubic meter of air (mg/m^3 and $\mu g/m^3$).

Air Quality Table 1
Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Standard	California Standard
Ozone (O_3)	8 Hour	0.075 ppm (147 µg/m^3)	0.070 ppm (137 µg/m^3)
	1 Hour	—	0.09 ppm (180 µg/m^3)
Carbon Monoxide (CO)	8 Hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)
	1 Hour	35 ppm (40 mg/m^3)	20 ppm (23 mg/m^3)
Nitrogen Dioxide (NO_2)	Annual	53 ppb (100 µg/m^3)	0.030 ppm (57 µg/m^3)
	1 Hour	100 ppb (188 µg/m^3)[a]	0.18 ppm (339 µg/m^3)
Sulfur Dioxide (SO_2)	24 Hour	—	0.04 ppm (105 µg/m^3)
	3 Hour	0.5 ppm (1300 µg/m^3)	—
	1 Hour	75 ppb (196 µg/m^3)[b]	0.25 ppm (655 µg/m^3)
Respirable Particulate Matter (PM10)	Annual	—	20 µg/m^3
	24 Hour	150 µg/m^3	50 µg/m^3
Fine Particulate Matter (PM2.5)	Annual	15 µg/m^3	12 µg/m^3
	24 Hour	35 µg/m^3 [c]	—
Sulfates (SO_4)	24 Hour	—	25 µg/m^3
Lead	30 Day Average	—	1.5 µg/m^3
	Rolling 3-Month Average	0.15 µg/m^3	—
Hydrogen Sulfide (H_2S)	1 Hour	—	0.03 ppm (42 µg/m^3)
Vinyl Chloride (chloroethene)	24 Hour	—	0.01 ppm (26 µg/m^3)
Visibility Reducing Particulates	8 Hour	—	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.

Source: ARB 2012a

Notes:

[a] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average must not exceed 100 ppb.

[b] To attain this standard, the 3-year average of the 99th percentiles of the daily maximum 1-hour average must not exceed 75 ppb.

[c] To attain this standard, the 3-year average of the 98th percentile of the daily concentrations must not exceed 35 µg/m^3.

ppm= parts per million

Air Quality Table 2 summarizes the attainment status of the project area in the Mojave Desert Air Basin (MDAB) for various currently-applicable state and federal Ambient Air Quality Standards (AAQS). The San Bernardino County portion of the MDAB is designated as nonattainment for the state ozone standard, and both state and federal PM10 standards. The MDAB is designated as attainment or unclassified for state and federal CO, NO_2, SO_2, and PM2.5. The U.S. EPA recently designated the West Mojave Desert Portion of San Bernardino County as nonattainment for the federal ozone standard (U.S. EPA 2012a). However, the project site is located in the attainment or unclassified portion of the area.

Air Quality Table 2
Federal and State Attainment Status Project Area in Mojave Desert Air Basin

Pollutant	Attainment Status	
	Federal	State
Ozone	Unclassifiable/Attainment [a]	Nonattainment
CO	Unclassifiable/Attainment	Unclassifiable/Attainment
NO_2	Unclassifiable/Attainment [b]	Attainment
SO_2	Unclassified	Attainment
PM10	Nonattainment	Nonattainment
PM2.5	Unclassified/Attainment	Unclassified [a]

Source: ARB 2011, U.S. EPA 2012a
[a] For the project site area only, not the entire MDAB.
[b] On February 17, 2012 U.S. EPA designated all of California as "unclassifiable/attainment" for the short-term NO_2 standard.

Since the adoption of the Commission Decision of ISEGS in 2010 (CEC 2010b), additional ambient air quality data have become available. **Air Quality Table 3** reflects the most recent data for the last five years. Values above the applicable limiting standards are shown in bold in the table. The 1-hour ozone background has decreased to be below the state standard since 2008; the 8-hour ozone background and the 24-hour PM10 background are still above the state standards, which is the same as in the October 2009 FSA.

As in the October 2009 FSA, all ozone, PM10, and PM2.5 data are from the Jean, Nevada, monitoring station that is located approximately 17 miles northeast of the project site; all CO data are from the Barstow monitoring station that is located approximately 100 miles west southwest of the project site; all SO_2 data are from the Trona-Athol and Telegraph monitoring station that is located approximately 110 miles west northwest of the project site.

In the October 2009 FSA, staff used the NO_2 background data at Jean, Nevada, station. However, the NO_2 data at the Jean station became unavailable after 2007. Staff compared the NO_2 data at the Jean station before 2007 and those at both Barstow and Trona stations. Staff concluded that both Barstow and Trona stations have higher NO_2 data than those at the Jean station, but the NO_2 data at the Trona station are closer to the Jean station data. Thus staff chose the Trona station to conservatively and reasonably represent the project site.

Air Quality Table 3
Criteria Pollutant Summary Maximum Ambient Concentrations (ppm or µg/m^3)

Pollutant	Averaging Period	Units	2007	2008	2009	2010	2011	Limiting AAQS
Ozone	1 hour	ppm	**0.092**	0.087	ND	0.082	0.085	0.09
Ozone	8 hours	ppm	**0.088**	**0.078**	**0.079**	**0.075**	**0.083**	0.070
PM10	24 hours	µg/m^3	**60**	**96**	**81**	49	**79**	50
PM10 [a]	Annual	µg/m^3	12.7	12.7	11.9	8.5	11.8	20
PM2.5	24 hours	µg/m^3	9.4	12.9	11.3	10.1	8.6	35
PM2.5 [a]	Annual	µg/m^3	4.1	4.5	4.0	3.5	3.7	12
CO	1 hour	ppm	1.4	1.4	1.2	1.3	4.4	20
CO	8 hours	ppm	0.7	1.2	0.9	0.9	1.4	9
NO_2	1 hour	ppm	0.055	0.062	0.049	0.052	0.049	0.18
NO_2	1 hour federal	ppm	0.046	0.043	0.039	0.043	0.042	0.1
NO_2	Annual	ppm	0.004	0.004	0.004	0.005	ND	0.030
SO_2	1 hour	ppm	0.011	0.009	0.009	0.008	0.011	0.075
SO_2	3 hours	ppm	0.010	0.007	0.007	0.007	0.010	0.5
SO_2	24 hours	ppm	0.005	0.004	0.003	0.003	0.006	0.04
SO_2	Annual	ppm	0.000	0.000	0.000	0.001	0.001	0.030

Source: U.S. EPA 2012b, ARB 2012b
ND - No Data
Notes:
[a] Annual average data is federal data and may not exactly represent California annual average.

Staff recommends the background ambient air concentrations in **Air Quality Table 4** for use in the impacts analysis. The recommended background concentrations are based on the maximum criteria pollutant concentrations from the past three years of available data collected at the most representative monitoring stations surrounding the project site.

Air Quality Table 4
Staff Recommended Background Concentrations (µg/m^3)

Pollutant	Averaging Time	Recommended Background	Limiting Standard	Percent of Standard
NO_2	1 hour	98	339	29%
	1 hour federal	80.8	188	43%
	Annual	9.5	57	17%
PM10	24 hour	**81**	**50**	**162%**
	Annual	12	20	60%
PM2.5	24 hour	11.3	35	32%
	Annual	4.0	12	33%
CO	1 hour	5,060	23,000	22%
	8 hour	1,556	10,000	16%
SO_2	1 hour	96.1	655	15%
	24 hour	15.8	105	15%
	Annual	2.7	80	3%

The background 24-hour concentration for PM10 is above the most restrictive existing ambient air quality standards, while the background concentrations for other pollutants and averaging times are all below the most restrictive existing ambient air quality standards, which is the same as in October 2009 FSA.

ANALYSIS

Increase Size of Auxiliary Boilers and Increase Maximum Daily Usage from 4 Hours to 24 Hours

Based upon final design refinements, the project owner has determined that a small increase in the size of the auxiliary boilers, from 231.1 MMBtu/hr to 249 MMBtu/hr, is required for efficient facility operation. This would result in a small increase in hourly emissions due to increased hourly fuel use as shown in **Air Quality Table 5**. The increase in heat input rating from 231.1 MMBtu/hr to 249 MMBtu/hr would not change the classification of the boilers relative to applicable regulations, including new source performance standards or Best Available Control Technology (BACT) requirements. The auxiliary boilers would be designed to meet a NOx level of 9 ppm, which would meet the NOx limit of 125 ppm for steam generators rated above 50 MMBtu/hr required by District Rule 476 – Steam Generating Equipment.

The project owner is also requesting an increase in daily operating hours from 4 hours to 24 hours. The project owner is requesting this change because infrequent situations occasionally arise that may extend boiler operation for the day until the situation is corrected. The auxiliary boilers were exempt from District BACT requirements (Rule 1303(A)) because the planned fuel use would result in emissions less than the BACT trigger level. The project owner's request to increase the daily operating hours and associated fuel use would trigger BACT for the emissions of NOx, VOC, and PM10 for each auxiliary boiler. The District released FDOC Revision D (MDAQMD 2012a) on October 5, 2012, and FDOC Revision E (MDAQMD 2012b) on November 1, 2012 to incorporate the proposed changes in the project. The District's FDOC Revision D and Revision E concluded that the project owner's proposed emission levels would meet the District's BACT requirements.

The project owner is not requesting an increase in annual fuel usage, which is limited by two conditions: **AQ-SC10** limits fuel use in the boilers in each solar facility to 5% of the total solar thermal input and **AQ-12** limits fuel use in the boilers in each solar facility to 328 million standard cubic feet (MMSCF) in any calendar year.

Add New Nighttime Preservation Boilers to Each Power Block

The project owner proposes to use one small (less than 10 MMBtu/hr each) natural gas-fired boiler in each of the three power blocks to maintain the condenser system vacuum overnight. The use of small boilers would be more efficient and less impactful than running the larger auxiliary boilers at greatly reduced loads overnight to achieve this vacuum. Firing the larger boilers at these greatly reduced loads would be thermally inefficient and would result in higher emissions on a pounds per million Btu (lb/MMBtu) basis. Alternatively, allowing the system to lose vacuum overnight without boilers would extend the daily start-up process, reducing the effectiveness of the project, and could

require incremental firing resulting in emissions increases beyond those presently permitted.

The project owner proposes to retain the annual fuel use limits on the auxiliary boilers currently in Conditions of Certification **AQ-SC10** and **AQ-12** and to incorporate the fuel used by the nighttime preservation boilers within these limits. The project owner proposes that the same emission factors (in lb/MMBtu) for the larger auxiliary boilers also apply to the nighttime boilers except for CO. The boiler manufacturers expect that CO emissions from a 10 MMBtu/hr boiler would be 50 ppm, rather than the 25 ppm for the auxiliary boilers. Thus, there would be a small increase (0.526 tons per year [tpy] as shown in **Air Quality Table 5**) in CO emissions due to the addition of each nighttime boiler, even though total annual fuel use is unchanged. There would be no increase in each facility's annual emissions of criteria pollutants other than CO as a result of the proposed addition of nighttime boilers. This small increase in CO emissions would result in a correspondingly small increase in project impacts, but the resulting impacts, after adding background CO concentrations would still be well below the applicable 1-hour and 8-hour ambient air quality standards.

Emissions from the nighttime boilers in **Air Quality Table 5** are based on maximum daily usage of 24 hours (includes daytime on a rainy or sunless day) and annual average usage of up to 16 hours per day.

The nighttime boilers would not be subject to NSPS subpart D, Da, Db, or Dc because they would be smaller than 10 MMBtu/hr. In addition, the nighttime boilers would not be subject to District BACT requirements (Rule 1303 (A)) because they would emit less than 25 pounds per day of all nonattainment pollutants.

Reduce the Size of Emergency Generators from 2,500 kW Each to 1,500 kW Each

The original project design included three 2,500 kW (3,750 bhp) emergency generators to provide backup power in power blocks in case of loss of line power. During final engineering design, the project owner has determined that the size of emergency generators can be reduced from 2,500 kW to 1,500 kW (2,250 bhp). Hours of usage of the smaller emergency generators for testing (no more than 30 minutes per test day, no more than 50 hours per year) would not change. The smaller emergency generators would still be subject to EPA Tier 2 requirements as approved. The proposed change would result in a reduction in emissions (**Air Quality Table 5**) and short term air quality impacts (**Air Quality Table 7**). The Tier 2 emergency generators would meet the requirement of District Rule 475 – Electric Power Generating Equipment (NOx limit of 160 ppmv, firing on liquid fuel; PM limit not to exceed 0.01 gr/dscf @ 3 percent O_2 and 5 kg/hour).

Add a 250 kW Emergency Generator in the Common Logistics Area

The original project design included one emergency generator for each of the three power blocks, but did not include an emergency power source for the common area. The project owner has determined that the common area should be served by its own small 250-kW (335-bhp) emergency generator. This would be a more efficient way of meeting any relatively small need for emergency power than calling on one of the larger

emergency generators in the power blocks. The new emergency generator would be tested no more than 30 minutes per test day, no more than 50 hours per year. The new engine would be subject to Tier 3 requirements. The Tier 3 emergency generator in the common area would meet the requirement of District Rule 475 – Electric Power Generating Equipment (NOx limit of 160 ppmv, firing on liquid fuel; PM limit not to exceed 0.01 gr/dscf @ 3 percent O_2 and 5 kg/hour). The increase of emissions due to the addition of the small emergency generator in the common area is much less than the decrease of emissions due to the size reduction in the emergency generators in the power blocks (**Air Quality Table 5**). Thus there would be a net decrease of emissions from the proposed changes in the emergency generators in the power blocks and in the common area.

Add a 106.5 hp Diesel Fire Pump Engine in the Common Logistics Area

The original project design provided one diesel fire pump engine for each of the three power blocks, but did not include a separate fire pump engine for the common area. The project owner has determined that a small (106.5-hp) fire pump in the common area is necessary to comply with fire codes. The new fire pump would be tested no more than 30 minutes per test day, no more than 50 hours per year. The new engine would be subject to Tier 3 requirements. The addition of the diesel fire pump engine in the common area would result in a slight increase of emissions.

Replace the Dry Cooling Systems with Partial Dry-Cooling Systems

During final engineering design, the project owner determined that certain auxiliary systems such as the main boiler feed pump lube oil and seal oil coolers, the steam turbine generator lube oil coolers, generator air coolers, solar receiver steam generator (SRSG) blowdown coolers, auxiliary boiler forced draft (FD) fan bearing coolers, boiler circulation pump heat exchangers, and sample panel coolers should be augmented with some evaporative cooling during hot weather to enhance cooling capacity for protection of critical equipment. The main process steam cooling system would remain as a solely dry cooling system.

A Wet Surface-Air Cooled condenser would replace a fin-fan cooler for the auxiliary systems. Under most conditions, all cooling would be provided by the dry portion of the cooling system. The wet portion would be operated only when the ambient temperature is 86°F or higher.

The wet portion of each cooling system would be a 1,638 gallon per minute (gpm) Wet Surface Air Cooler (WSAC). Particulate emissions result from evaporation of the cooling water that drifts (escapes) from the fluid cooler. Particulate emissions from each cooling system in each power block would be very small and this increase would not result in a significant air quality impact. The increase would be no more than about 14 pounds per year assuming 8,760 hours of operation per year; actual hours of operation would be less. The partial dry cooling systems are exempt from District permit requirements because the water flow would be less than 10,000 gpm and the unit would not be used for evaporative cooling of process water (MDAQMD Rule 219 (E)(4)(c)).

Move Each Auxiliary Boiler 30 Feet

In general, moving emission sources within the project fence line would possibly affect the air quality impacts at the fence line and further downwind if the emission sources are moved closer to the fence line and complex terrain. However, because of the large size of the power blocks of ISEGS and the long distance (more than 2,400 feet) from the boilers to the fence line, the effect of moving the boilers 30 feet would be negligible.

SUMMARY OF EMISSIONS

After the project owner's February 2010 Biological Mitigation Proposal (BSE 2010), the District updated air emissions calculations in the FDOC Revision C (MDAQMD 2010). Energy Commission staff used an "envelope approach" in the March 2010 FSA Addendum (CEC 2010a) but did not update the emissions calculations of criteria pollutants because the Biological Mitigation Proposal was based on an overall reduction in air quality emissions compared to those in the October 2009 FSA (CEC 2009). The criteria pollutants emissions in the Commission Decision (CEC 2010b) were also based on October 2009 FSA (CEC 2009) before the Biological Mitigation Proposal. Thus, the District's FDOC Revision C (MDAQMD 2010) has the most updated air emissions for the approved project. On October 5, 2012, the District released Final Determination of Compliance (FDOC) Revision D and Revision E (MDAQMD 2012a, MDAQMD 2012b) to incorporate the currently-proposed changes in the project.

Air Quality Table 5 compares the maximum hourly, maximum daily, and annual emissions of *each unit of equipment* from the propose changes and those from the approved project in the District's FDOC Revision C (MDAQMD 2010). In **Air Quality Table 5**, ~~strikethrough~~ is used to indicate emissions from the District's FDOC Revision C (MDAQMD 2010), **underline and bold** is used to represent emissions from proposed changes in the project based on the District's FDOC Revision E (MDAQMD 2012b) and the project owner's Petition to Amend (CH2MHILL 2012). **Air Quality Table 6** shows corresponding values and totals for the entire facility.

Air Quality Table 5
ISEGS Operation – Comparison of Maximum Hourly, Daily, and Annual Emissions of Each Equipment from Proposed Changes and the Approved Project [a]

	Maximum Hourly Emissions (lbs/hr)					
Emission Source (each)	**NOx**	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Auxiliary boiler	**2.7** ~~2.5~~	**0.7** ~~0.6~~	**4.6** ~~4.2~~	**1.3** ~~1.2~~	1.7	1.7
Nighttime boiler	**0.1**	**0.03**	**0.4**	**0.04**	**0.07**	**0.07**
Emergency engine each power block	**11.9** ~~20~~	**0.01**[d] ~~0.02~~	**6.45** ~~10.75~~	**0.25** ~~0.41~~[b]	**0.37** ~~0.62~~	**0.37** ~~0.62~~
Fire pump each power block	1.6	**0.004**[e] ~~0.002~~	1.38	**0.26** ~~0.07~~[c]	0.08	0.08
Common area emergency engine	**1.10**	**0.00**	**0.95**	**0.18**	**0.06**	**0.06**
Common area fire pump	**0.7**	**0.002**	**0.61**	**0.12**	**0.04**	**0.04**
Cooling system	**-**	**-**	**-**	**-**	**0.002**	**0.002**

Air Quality Table 5 (continued)

	Maximum Daily Emissions (lbs/day)					
Emission Source (each)	**NOx**	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Auxiliary boiler	**64.9** ~~10~~	**17.1** ~~2.6~~	**109.7** ~~17.0~~	**31.7** ~~4.9~~	**41.8** ~~6.6~~	**41.8** ~~6.6~~
Nighttime boiler	**2.6**	**0.7**	**8.9**	**1.0**	**1.7**	**1.7**
Emergency engine each power block	**11.9** ~~20~~	**0.01**[d] ~~0.02~~	**6.45** ~~10.75~~	**0.25** ~~0.41~~[b]	**0.37** ~~0.62~~	**0.37** ~~0.62~~
Fire pump each power block	1.6	**0.004**[e] ~~0.002~~	1.38	**0.26** ~~0.07~~[c]	0.08	0.08
Common area emergency engine	**1.10**	**0.00**	**0.95**	**0.18**	**0.06**	**0.06**
Common area fire pump	**0.7**	**0.002**	**0.61**	**0.12**	**0.04**	**0.04**
Cooling system	**-**	**-**	**-**	**-**	**0.039**	**0.039**
	Annual Emissions (tons/year)					
Emission Source (each)	**NOx**	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Auxiliary boiler	1.8	0.5	3.1	0.9	1.2	1.2
Nighttime boiler	**-**	**-**	**0.526**	**-**	**-**	**-**
Emergency engine each power block	**0.60** ~~0.99~~	0.00	**0.32** ~~0.54~~	**0.01** ~~0.02~~[b]	**0.02** ~~0.03~~	**0.02** ~~0.03~~
Fire pump each power block	0.04	0.000	0.034	**0.006** ~~0.002~~[c]	0.002	0.002
Common area emergency engine	**0.055**	**0.000**	**0.048**	**0.009**	**0.003**	**0.003**
Common area fire pump	**0.018**	**0.000**	**0.015**	**0.003**	**0.001**	**0.001**
Cooling system	**-**	**-**	**-**	**-**	**0.007**	**0.007**

Source: CEC 2010b, CH2MHILL 2012, MDAQMD 2010, MDAQMD 2012b

Notes:

[a] ~~Strikethrough~~ is used to indicate emissions from the District's FDOC Revision C (MDAQMD 2010), **underline and bold** is used to represent emissions from proposed changes based on the District's FDOC Revision E (MDAQMD 2012b) and the project owner's Petition to Amend (CH2MHILL 2012).

[b] FDOC Revision C (MDAQMD 2010) did not include VOC emissions from the emergency engines in the power blocks. The permitted VOC emissions of each power block emergency engine are from the Commission Decision (CEC 2010b).

[c] FDOC Revision C (MDAQMD 2010) did not include VOC emissions from the fire pumps in the power blocks. The permitted VOC emissions of fire pump in each power block are from the Commission Decision (CEC 2010b).

[d] Staff calculated the SO_2 emissions from the emergency generator engine based on fuel sulfur content of 0.0015%, fuel use of 104.8 gal/hr (CH2MHILL 2012), 30 minutes of testing per day, and 50 hours of testing per year.

[e] From FDOC Revision E (MDAQMD 2012b).

In **Air Quality Table 6**, staff compares the emissions calculations during operation for the whole project as approved in the Commission Decision (CEC 2010b) and those from the proposed changes in the project. ~~Strikethrough~~ is used to indicate emissions in

the Commission Decision, **underline and bold** is used to represent emissions from proposed changes.

In the October 2009 FSA and Commission Decision, staff assumed that only one of the three emergency generators would operate one-half hour for testing purposes simultaneously with other emission sources during an hour. In addition, staff assumed the emergency fire pumps would not operate for testing during the same hour when one of the emergency generator engines is operating for testing. Thus the maximum hourly emissions from emergency fire pumps were not accounted for in the total maximum hourly emissions but were accounted for in the total maximum daily and annual emissions. Similarly for this amendment, staff added the emissions from one emergency generator engine in the power blocks and the emergency generator engine in the common area in the maximum hourly emissions; staff does not account for the hourly emissions of fire pumps in the maximum hourly emissions but in the maximum daily and annual emissions.

The daily and annual emissions include emissions from all the sources in each category from the proposed changes. For example, the boilers category includes all three auxiliary boilers and all three nighttime boilers; the emergency generator engines include all three emergency engines in the power blocks and the emergency engine in the common area. Staff kept the emissions from the maintenance vehicles and employee and delivery vehicles at the same levels as approved in the Commission Decision.

Air Quality Table 6 shows the total maximum hourly emissions from the proposed changes would be lower than those permitted in the Commission Decision. Maximum daily emissions would increase due to the proposed changes mainly because of the increase in the size and daily usage of the auxiliary boilers. Annual emissions would be lower than the annual emissions approved in the Commission Decision, which were based on a larger project design before the Biological Mitigation Proposal (BSE 2010).

Air Quality Table 6
ISEGS Operation – Maximum Hourly, Maximum Daily, and Annual Emissions

	Maximum Hourly Emissions (lbs/hr)					
Emission Source	**NOx**	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Boilers	**8.44** ~~10.00~~	**2.22** ~~2.50~~	**14.82** ~~16.90~~	**4.09** ~~4.90~~	**5.44** ~~6.80~~	**5.44** ~~6.80~~
Emergency Generator Engines	**13.0** ~~19.43~~	**0.01** ~~0.02~~	**7.4** ~~10.75~~	**0.43** ~~0.41~~	**0.43** ~~0.62~~	**0.43** ~~0.57~~
Emergency Fire Pump Engines	0.00	0.00	0.00	0.00	0.00	0.00
Maintenance Vehicles (all types)	2.32	0.02	1.48	0.18	14.60	3.13
Employee and Delivery Vehicles (offsite)	3.62	0.03	19.15	1.88	1.40	0.37
Cooling Systems	**-**	**-**	**-**	**-**	**0.01**	**0.01**
Total Maximum Hourly Emissions	**27.38** ~~35.38~~	**2.28** ~~2.57~~	**42.85** ~~48.28~~	**6.57** ~~7.38~~	**21.88** ~~23.41~~	**9.38** ~~10.87~~
Net Hourly	-8.0	-0.29	-5.43	-0.81	-1.53	-1.49

Emissions Change						

	Air Quality Table 6 (continued) Maximum Daily Emissions (lbs/day)					
Emission Source	**NOx**	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Boilers	**202.5** ~~40.0~~	**53.3** ~~10.0~~	**355.6** ~~67.6~~	**98.1** ~~19.6~~	**130.5** ~~27.2~~	**130.5** ~~27.2~~
Emergency Generator Engines	**36.8** ~~77.7~~	0.03	**20.3** ~~43.0~~	**0.9** ~~1.7~~	**1.2** ~~2.5~~	**1.2** ~~2.3~~
Emergency Fire Pump Engines	**5.5** ~~4.6~~	0.01	**4.7** ~~4.1~~	**0.9** ~~0.2~~	**0.3** ~~0.2~~	**0.3** ~~0.2~~
Maintenance Vehicles (all types)	18.6	0.2	11.9	1.4	116.8	25.0
Employee and Delivery Vehicles (offsite)	20.5	0.2	101.9	10.0	7.4	2.0
Cooling Systems	**-**	**-**	**-**	**-**	**0.1**	**0.1**
Total Maximum Daily Emissions	**283.9** ~~161.4~~	**53.7** ~~10.4~~	**494.4** ~~228.4~~	**111.3** ~~32.9~~	**256.3** ~~154.1~~	**159.1** ~~56.7~~
Net Daily Emissions Change	122.5	43.3	266.0	78.4	102.2	102.4

	Annual Emissions (tons/year)					
Emission Source	**NOx**	**SOx**	**CO**	**VOC**	**PM10**	**PM2.5**
Boilers	**5.5** ~~7.3~~	**1.4** ~~1.8~~	**10.9** ~~12.3~~	**2.7** ~~3.6~~	**3.5** ~~5.0~~	**3.5** ~~5.0~~
Emergency Generator Engines	**1.8** ~~3.9~~	0.0	**1.0** ~~2.1~~	**0.0** ~~0.1~~	0.1	0.1
Emergency Fire Pump Engines	0.1	0.0	0.1	0.0	0.0	0.0
Maintenance Vehicles (all types)	2.3	0.0	1.5	0.2	14.6	3.1
Employee and Delivery Vehicles (offsite)	1.8	0.0	17.1	1.7	1.2	0.3
Cooling Systems	**-**	**-**	**-**	**-**	**0.0**	**0.0**
Total Annual Emissions	**11.6** ~~15.4~~	**1.4** ~~1.9~~	**30.6** ~~33.1~~	**4.6** ~~5.5~~	**19.4** ~~20.9~~	**7.0** ~~8.5~~
Net Annual Emissions Change	-3.8	-0.5	-2.5	-0.9	-1.5	-1.5

Source: CEC 2010b, CH2MHILL 2012, MDAQMD 2012b

OPERATION IMPACTS

The project owner revised the air pollution dispersion modeling in order to demonstrate that the proposed project changes do not affect the conclusions in the previous analysis. Staff reviewed the dispersion modeling files from the project owner and modified the modeling files when it was necessary.

The 1-hour NO_2 NAAQS was not finalized during original Application for Certification (AFC) of the project. Thus compliance with the new 1-hour NO_2 NAAQS was not demonstrated previously. Sierra Research, on behalf of the project owner, submitted a new analysis to demonstrate compliance with the new 1-hour NO_2 NAAQS for the proposed changes (Sierra 2012). Following recommendations in U.S. EPA guidance (U.S. EPA 2011), Sierra Research did not include emissions from the testing of the emergency engines and fire pump engines in the new 1-hour NO_2 NAAQS analysis. Staff did its own conservative analysis by adding the emergency engines and fire pump engines in the 1-hour NO_2 NAAQS analysis. The results staff got from this analysis for both state and federal 1-hour NO_2 (shown in **Air Quality Table 7**) are higher than those provided by Sierra Research, but are still far lower than the standards.

Staff also noticed that nighttime boilers were not included in the dispersion modeling except for the NO_2 modeling. Cooling towers were not included in the PM modeling. Since these emission sources are small compared to other sources and far away from the project fence line, it is unlikely that these sources would contribute significantly to the total impacts based on staff's experience from other solar projects.

Furthermore, the project owner did not provide dispersion modeling for auxiliary boilers going through startup or hot standby. Instead, the project owner included emergency engines and fire pumps with auxiliary boilers during full-load operations in short term impacts analysis except for NO_2, for which staff did an independent analysis as described above. Staff reviewed other similar solar power plants and noticed that emissions of auxiliary boilers going through startup or hot standby are similar to or lower than emissions of boilers during full-load operations. In addition, short term impacts are dominated by the emergency engines instead of the boilers. Thus, staff believes the project owner did a reasonable short term impacts analysis by including the emergency engines and fire pumps with the boilers operating at full load.

Air Quality Table 7 compares the permitted previous impacts with impacts due to the proposed changes in the project. The 1-hour NO_2 (state standard) and 1-hour SO_2 impacts would be lower because of the smaller emergency generator engines in the power blocks, which dominate the 1-hour impacts. Staff noticed that the new 1-hour CO impacts would be a little higher than the permitted old impacts, which were modeled based on a low CO emission factor (0.41 g/bhp-hr while permitted level is 2.6 g/bhp-hr) based upon data from the emergency generator vendor as shown in AFC Table 5.1B-2 (BSE 2007a). The 8-hour and 24-hour impacts would be a little higher than the old impacts because of the proposed increase in the size and daily use of the auxiliary boilers.

Staff calculated new total impacts by adding the new project impacts with staff recommended background data from **Air Quality Table 4**. All of the total impacts are below applicable state and federal standards except for 24-hour PM10. It should be noted that the existing 24-hour average PM10 background concentrations already exceed the state standard. Any small increment of the PM10 impact would be considered to be CEQA significant. Mitigation conditions in the Commission Decision **AQ-SC6** to mitigate the onsite maintenance vehicle emissions and **AQ-SC7** to mitigate the operating fugitive dust emissions would ensure that the potential PM10 CEQA impacts are mitigated to less than significant over the life of the project.

Air Quality Table 7
ISEGS Operation Impacts

Pollutants	Avg. Period	Previous Impacts ($\mu g/m^3$)	New Impacts ($\mu g/m^3$)	Background ($\mu g/m^3$)	New Total Impacts ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2[a]	1-hr	126.7	112.3	98	210.3	339	62%
	1-hr federal	-	-	-	102.7[b]	188	55%
	Annual	0.0	0.0	9.5	9.5	57	17%
PM10	24-hr	0.1	0.4	**81**	**81.4**	**50**	**163%**
	Annual	0.0	0.0	12	12	20	60%
PM2.5	24-hr	0.1	0.4	11.3	11.7	35	33%
	Annual	0.0	0.0	4	4	12	33%
CO	1-hr	73.3	80	5,060	5,140	23,000	22%
	8-hr	1.6	3.5	1,556	1,560	10,000	16%
SO_2	1-hr	4.1	3	96.1	99.1	665	15%
	24-hr	0.0	0.3	15.8	15.9	105	15%
	Annual	0.0	0.0	2.7	2.7	80	3%

Source: CH2MHILL 2012, Sierra 2012, staff's independent analysis
[a] Staff did its own analysis for state and federal 1-hour NO_2 standards. Staff added emergency generator engines and fire pump engines in the 1-hour NO_2 modeling to be more conservative.
[b] Three-year average of 98th percentile of daily maximum 1-hour modeled project impacts combined with concurrent hourly monitored NO_2 concentration for period 2008-2010.

CUMULATIVE IMPACTS

The proposed Project Amendment would not change any project mitigation measures designed to reduce potential air quality impacts from the project to less-than-significant levels. All the air quality impacts would be lower than applicable federal and state standards except for PM10 since the background PM10 concentrations already exceed the state standard. Staff expects no cumulative adverse impacts would occur as a result of the proposed changes to the ISEGS project after implementation of the mitigation measures approved by the Commission Decision.

CONCLUSIONS AND RECOMMENDATIONS

The requested project changes would comply with applicable Federal, State, and MDAQMD air quality laws, ordinances, regulations, and standards. Compliance with all district Rules and Regulations was demonstrated to the District's satisfaction in the FDOC Revision D and Revision E. Staff concludes the amended project would not cause significant air quality impacts, provided that all conditions of certification (CoCs) from the original Commission Decision continue to apply with the following revised COCs as shown below.

PROPOSED MODIFICATIONS TO CONDITIONS OF CERTIFICATION

Below is a list of those Conditions of Certification that must be revised from those in effect as of the Commission Decision (CEC 2010b). These changes will be consistent

with current MDAQMD permit requirements (MDAQMD 2012b). ~~Strikethrough~~ is used to indicate deleted language and **underline and bold** is used for new language.

DISTRICT CONDITIONS OF CERTIFICATION

CONDITIONS APPLICABLE TO IVANPAH 1, 2 & 3 (THREE - 3) ***AUXILIARY*** *BOILERS, MDAQMD APPLICATION NUMBERS/PERMIT NUMBERS; 00009311 (B010375) 00009314 (B010376) & 00009320 (B010377),* ***each consisting of:***

~~**Equipment Description:**~~

~~Nebraska~~ **Rentech D-type water tube** boilers, ~~Model NSX-G-120,~~ each equipped with ~~Natcom~~ **Todd-Coen Ultra** Low-NOx Burners rated at a maximum heat input of ~~231.1~~**249** MMBTU/hr, and flue gas recirculation (FGR or EGR) ~~operating at 13.9 percent excess air~~, fueled exclusively on utility grade natural gas. Equipment shall use ~~no more than 225,000~~**242,500** cu-ft/hr of fuel and provide ~~220,000~~**175,000** lb/hr of steam. Each boiler is equipped with a stack that is 130 feet high and ~~40~~**60** inches in diameter.

These conditions (**AQ-5, 6** and **AQ-12**) apply separately to each boiler unless otherwise specified.

AQ-5 Not later than 180 days after initial startup, the **owner/**operator shall perform an initial compliance test on this boiler in accordance with the District Compliance Test Procedural Manual. This test shall demonstrate that this equipment does not exceed the following emission maximums:

Pollutant	ppmvd	Lb/MMBtu	Lb/hr	
*NOx	9.0	0.011	2.**7**~~5~~	(Per USEPA Methods 19 and 20)
SO~~x~~**2**	1.7	0.003	0.**7**~~6~~	
*CO	25.0	0.018	4.**6**~~2~~	(Per USEPA Method~~s~~ 10)
VOC	12.6	0.00**5**~~4~~	1.**3**~~2~~	(Per USEPA Methods 25A and 18)
PM10	n/a	0.007	1.7	(Per USEPA Method~~s~~ **201A** ~~5 and 202 or CARB Method 5~~)

*corrected to 3% oxygen, on a dry basis, averaged over one hour
Opacity shall be conducted per Method 9; Flue gas flow rate shall be quantified in dscf per USEPA Methods 1 through 5.

Verification: The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the District and to the CPM within 60 days of the date of the tests.

AQ-6 The owner/operator shall perform annual compliance tests in accordance with the District Compliance Test Procedural Manual. Prior to performing these annual tests, the boiler shall be tuned in accord with the manufacturer's specified tune-up procedure, by a qualified technician. Subsequent tests shall demonstrate that this equipment does not exceed the following emission maximums:

Pollutant	ppmvd	Lb/MMBtu	Lb/hr	
*NOx	9.0	0.011	2.7~~5~~	(Per USEPA Methods 19 and 20)
SO~~x~~**2**	1.7	0.003	0.7~~6~~	
*CO	25.0	0.018	4.6~~2~~	(Per USEPA Method~~s~~ 10)
VOC	12.6	0.00**5**~~4~~	1.3~~2~~	(Per USEPA Methods 25A and 18)
PM10	n/a	0.007	1.7	(Per USEPA Method~~s~~ **201A** ~~5 and 202 or CARB Method 5~~)

*corrected to 3% oxygen, on a dry basis, averaged over one hour
Opacity shall be conducted per Method 9; Flue gas flow rate shall be quantified in dscf per USEPA Methods 1 through 5.

Verification: The project owner shall notify the District and the CPM within fifteen (15) working days before the execution of the compliance test required in this condition. The test results shall be submitted to the District and to the CPM within 60 days of the date of the tests.

AQ-12 **The combined fuel use from the auxiliary boilers and nighttime preservation boilers shall not exceed** ~~This boiler shall not burn more than 0.9 MMSCF of natural gas in any single day, and no more than~~ 328 MMSCF **of natural gas** in any calendar year~~.~~**; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers; B010375 and B011544 (Ivanpah 1); B010376 and B011572 (Ivanpah 2); B010377 and B011573 (Ivanpah 3).**

~~a. These limits shall not apply during the facility commissioning period. The commissioning period shall begin the first time fuel is fired in the boiler. The commissioning period shall end when the facility achieves commercial operation, but no later than 180 days after first fire.~~

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

*CONDITIONS APPLICABLE TO IVANPAH I, II, AND III EMERGENCY FIRE PUMPS, MDAQMD APPLICATION NUMBERS/PERMIT NUMBERS; 00009312 (E010380), 00009315 (E010378), AND 00009319 (E010384)**, each consisting of:***

~~**Equipment Description:**~~

Year of Manufacture 2010, Tier III, One Clarke, Diesel fired internal combustion engine, Model No. JU6H-UF62, and Serial number tbd, After Cooled, Direct Injected, Turbo Charged, producing 240 bhp with 6 cylinders at 2,600 rpm (or equiv.) while consuming a maximum of 10 gal/hr. This equipment powers a pump.

These conditions (**AQ-13** through **AQ-19** ~~**AQ-22**~~) apply separately to all three emergency fire pump engines unless otherwise specified.

AQ-13 This **engine, certified in accordance with 40 Code of Federal Regulations (CFR) Part 89, and after treatment control device (if any)** ~~system~~ shall be installed, operated and maintained **according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by** ~~in strict accord with those recommendations of~~ the manufacturer~~/supplier and/or~~

~~sound engineering principles which produce the minimum emissions of contaminants~~. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit. **[40 CFR Part 60 Subparts 60.4205 and 60.4211]**

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or CEC staff.

~~**AQ-14** These engines may operate in response to notification of impending rotating outage if the area utility has ordered rotating outages in the area where the engines are located or expects to order such outages at a particular time, the engines are located in the area subject to the rotating outage, the engines are operated no more than 30 minutes prior to the forecasted outage, and the engines are shut down immediately after the utility advises that the outage is no longer imminent or in effect.~~

~~**Verification:** During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.~~

~~**AQ-15** These engines may operate in response to fire suppression requirements and needs.~~

~~**Verification:** Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.~~

AQ-14 ~~**AQ-16**~~ **This** ~~These~~ unit~~s~~ shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per ARB Diesel or equivalent requirements. **[17 California Code of Regulations (CCR) 93115; 60.4207(b)]**

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-15 ~~**AQ-17**~~ A non-resettable **meter with a minimum display capability of** ~~four-digit (9,999)~~ hour**s** ~~timer~~ shall be installed and maintained on **this** ~~these~~ unit~~s~~ to indicate elapsed engine operating time. **[Title 17 CCR §93115.10(e)(1)]. District and State Only**

Verification: At least thirty (30) days prior to the installation of the engine, the project owner shall provide the District and the CPM the specification of the hour timer.

AQ-16 ~~**AQ-18**~~ **This** ~~These~~ unit~~s~~ shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than **0.5 hours per day for a total of** 50 hours per year~~, and no more than 0.5 hours per day~~ for testing and maintenance~~, excluding compliance source testing~~. ~~Time required~~

~~for source testing will not be counted toward the~~ **The** 50 hour ~~per year~~ limit~~.~~ **can be exceeded when the emergency fire pump assembly is driven directly by a stationary diesel fueled CI engine when operated per and in accord with the National Fire Protection Association (NFPA) 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 1998 edition. This requirement includes usage during emergencies. [[District Rule 1302(C)(2)(a) and Rule 1304 (D)(1)(a)] and 17 CCR 93115.3(n)] [Hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements.]**

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

~~**AQ-19** The hour limit of **AQ-18** can be exceeded when the emergency fire pump assemblies are driven directly by a stationary diesel fueled CI engine when operated per and in accord with the National Fire Protection Association (NFPA) 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 2006 edition or the most current edition approved by the CARB Executive Officer. [Title 17 CCR 93115(c)16]~~

~~**Verification:** During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.~~

AQ-17~~**AQ-20**~~ The owner/operator shall maintain a**n** operations log for **this** ~~these~~ unit~~s~~ current and on-site~~,~~ **(**either at the engine location or at a on-site location**)**~~,~~ for a minimum of **five (5)** ~~two (2)~~ years, ~~and for another year where it can be made available to the District staff within 5 working days from the District's request,~~ and this log shall be provided to District, State and Federal personnel upon request.

The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);

b. Reason for use (testing & maintenance, emergency, required emission testing**, etc.**);

c. **Monthly and c**~~C~~alendar year operation in terms of fuel consumption (in gallons) and total hours **[17 CCR 93115]**; and,

d. Fuel sulfur concentration (the owner/operator may use the supplier's certification of sulfur content if it is maintained as part of this log**.**) **[17 CCR 93115]**~~.; and~~

~~e. Documentation of maintenance as per manufacturer's recommendations and good maintenance practices.~~

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-18 These engines may operate in response to fire suppression requirements and needs. [Rule 204]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-19~~**AQ-21**~~ **This** ~~These fire protection~~ unit~~s~~ **is** ~~are~~ subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (~~Title~~ 17 CCR **§**93115) **and 40 Code of Federal Regulations (CFR) Part 60, Subpart IIII (NSPS)**. In the event of conflict between these conditions and the ATCM **or NSPS**, the more stringent requirements shall govern.

Verification: ~~Not necessary.~~ **The project owner shall submit to the District and the CPM the engine specifications at least 30 days prior to purchasing the engines for review and approval demonstrating that the engines meet the ATCM and NSPS emission limit requirements at the time of engine purchase.**

~~**AQ-22** This unit is subject to the requirements of the Federal New Source Performance Standards (NSPS) for Stationary Compression Ignition Internal Combustion Engines (40 CFR Part 60 Subpart IIII).~~

~~**Verification:** Verification: The project owner shall submit to the District and the CPM the engine specifications at least 30 days prior to purchasing the engines for review and approval demonstrating that the engines meet NSPS emission limit requirements at the time of engine purchase.~~

CONDITIONS APPLICABLE TO IVANPAH I, II, AND III ***(THREE - 3)*** *EMERGENCY GENERATORS, MDAQMD APPLICATION NUMBERS/PERMIT NUMBERS; 00009313 (E010381), 00009316 (E010379), AND 00009317 (E010382)***, each consisting of:**

Equipment Description:

Year of Manufacture 2010, Tier II, One Caterpillar, Diesel fired internal combustion engine, Model No. 351**2C**~~6C HD~~, and Serial No. tbd, After Cooled, Direct Injected, Turbo Charged, producing **2250**~~3,750~~ bhp with 16 cylinders at 1,800 rpm ~~(or equiv.)~~ while consuming a maximum of ~~173~~**105** gal/hr. This equipment powers a Generator.

These conditions (AQ-**20**~~23~~ through AQ-**26**~~31~~) apply separately to all three emergency generator engines unless otherwise specified.

AQ-20~~**AQ-23**~~ **This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written**

instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit. [40 CFR Part 60 Subparts 60.4205, and 60.4211] ~~Engine may operate in response to notification of impending rotating outage if the area utility has ordered rotating outages in the area where the engine is located or expects to order such outages at a particular time, the engine is located in the area subject to the rotating outage, the engine is operated no more than 30 minutes prior to the forecasted outage, and the engine is shut down immediately after the utility advises that the outage is no longer imminent or in effect.~~

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-21~~**AQ-24**~~ This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per ARB Diesel or equivalent requirements. **[17 CCR 93115; 60.4207(b)]**

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

~~**AQ-25** This equipment shall be installed, operated and maintained in strict accord with those recommendations of the manufacturer/supplier and/or sound engineering principles which produce the minimum emissions of contaminants. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit.~~

~~**Verification:** During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.~~

AQ-22~~**AQ-26**~~ A non-resettable **hour meter with a minimum display capability of** ~~four-digit (~~9,999~~)~~ hour**s** ~~timer~~ shall be installed and maintained on this unit to indicate elapsed engine operating time. **[Title 17 CCR §93115.10(e)(1)]. District and State Only**

Verification: At least thirty (30) days prior to the installation of the engine, the project owner shall provide the District and the CPM the specification of the hour timer.

AQ-23 This unit shall not be used to provide power during a voluntary power outage and/or power reduction initiated under an Interruptible Service Contract (ISC), Demand Response Program (DRP), Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier. [17 CCR 93115] [40 CFR 60 Subpart IIII allowance for DRP streamlined out.]

Verification: **During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.**

AQ-24~~**AQ-27**~~ This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than **0.5 hours per day for a total of** 50 hours per year~~, and no more than 0.5 hours per day~~ for testing and maintenance~~, excluding compliance source testing~~. ~~Time required for source testing will not be counted toward the 50 hour per year limit.~~ **[NSR and 17 CCR 93115] [Hours allowed by 60.42(f) streamlined out.]**

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-25~~**AQ-28**~~ The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);

b. Reason for use (testing & maintenance, emergency, required emission testing**, etc.**);

c. **Monthly and c**~~C~~alendar year operation in terms of fuel consumption (in gallons) and total hours **[17 CCR 93115]**; **and,**

~~d.~~ Fuel sulfur concentration (the owner/operator may use the supplier's certification of sulfur content if it is maintained as part of this log) **[17 CCR 93115]** ~~and,~~

~~e. Documentation of maintenance as per manufacturer's recommendations and good maintenance practices.~~

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-26~~**AQ-29**~~ This **unit** ~~genset~~ is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (Title 17 CCR **§**93115) **and 40 CFR Part 60, Subpart IIII (NSPS)**. In the event of conflict between these conditions and the ATCM **or NSPS**, the more stringent requirements shall govern.

Verification: ~~Not necessary.~~ **The project owner shall submit to the District and the CPM the engine specifications at least 30 days prior to purchasing the**

engines for review and approval demonstrating that the engines meet the ATCM and NSPS emission limit requirements at the time of engine purchase.

~~**AQ-30** This unit shall not be used to provide power during a voluntary agreed to power outage and/or power reduction initiated under an Interruptible Service Contract (ISC); Demand Response Program (DRP); Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier.~~

~~**Verification:** During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.~~

~~**AQ-31** This unit is subject to the requirements of the Federal New Source Performance Standards (NSPS) for Stationary Compression Ignition Internal Combustion Engines (40 CFR Part 60 Subpart IIII).~~

~~**Verification:** Verification: The project owner shall submit the engine specifications at least 30 days prior to purchasing the engines for review and approval demonstrating that the engines meet NSPS emission limit requirements at the time of engine purchase.~~

***CONDITIONS APPLICABLE TO IVANPAH 1, 2, & 3 (Three - 3) NIGHTTIME PRESERVATION BOILERS, MDAQMD APPLICATION NUMBERS/PERMIT NUMBERS; MD100000063 (B011544), MD100000064 (B011572) & MD100000065 (B011573)*, each consisting of:**

equipped with Low-NOx Burners rated at a maximum heat input of less than 10.0 MMBTU/hr, fueled exclusively on utility grade natural gas. Equipment shall use 9,730 cu-ft/hr of fuel and provide 5,000 lb/hr of steam.

These conditions (AQ-27 through AQ-34) apply separately to all three nighttime preservation boilers unless otherwise specified.

AQ-27 Operation of this equipment must be conducted in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.

Verification: Any non-compliant operations shall be listed in the Annual Compliance report (COMPLIANCE-7).

AQ-28 The owner/operator shall operate this equipment in strict accord with the recommendations of the manufacturer or supplier and/or sound engineering principles and consistent with all information submitted with the application for this permit, which produce the minimum emission of air contaminants.

Verification: As part of the Annual Compliance Report (COMPLIANCE-7), the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-29 This boiler shall use only natural gas as fuel and shall be equipped with a meter measuring fuel consumption in standard cubic feet.

Verification: As part of the Annual Compliance Report (COMPLIANCE-7), the project owner shall include proof that only pipeline quality, or Public Utility Commission regulated natural gas is used in these boilers.

AQ-30 The owner/operator shall maintain a current, on-site (at a central location if necessary) log for this equipment for five (5) years, which shall be provided to District, state, or federal personnel upon request. This log shall include calendar year fuel use for this equipment in standard cubic feet, or BTUs, and daily hours of operation.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or Energy Commission staff.

AQ-31 The owner/operator shall perform annual tune-ups in accordance with the unit manufacturer's specified tune-up procedure, by a qualified technician.

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or Energy Commission staff.

AQ-32 Records of fuel supplier certifications of fuel sulfur content shall be maintained to demonstrate compliance with the sulfur dioxide and particulate matter emission limits.

Verification: Condition of Certification AQ-29 shall be used to demonstrate compliance with this condition.

AQ-33 The owner/operator shall continuously monitor and record fuel flow rate.

Verification: At least 120 days prior to construction of the boiler stacks, the project owner shall provide the District for approval, and the CPM for review, a detailed drawing and a plan on how the measurements and recordings, required by this condition, will be performed by the chosen monitoring system.

AQ-34 The combined fuel use from the auxiliary boiler and the nighttime preservation boiler shall not exceed 328 MMSCF of natural gas in any calendar year; combined fuel use is the sum total of natural gas combusted from Boilers with MDAQMD permit numbers; B010375 and B011544 (Ivanpah 1); B010376 and B011572 (Ivanpah 2); B010377, and B011573 (Ivanpah 3).

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

***CONDITIONS APPLICABLE TO COMMON AREA EMERGENCY GENERATOR, MDAQMD APPLICATION NUMBERS/PERMIT NUMBERS; MD100000061 (E011546),* consisting of:**

Year of Manufacture 2010, Tier III, Located in the Common Logistics Area; One TBD, Diesel fired internal combustion engine Model No. TBD and Serial No. TBD, producing 333 bhp with TBD cylinders at TBD rpm while consuming a maximum of TBD gm/bhp-hr.

AQ-35 This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the application for this permit. [40 CFR Part 60 Subparts 60.4205, and 60.4211]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-36 This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15 ppm) on a weight per weight basis per CARB Diesel or equivalent requirements. [17 CCR 93115; 60.4207(b)]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-37 A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed and maintained on this unit to indicate elapsed engine operating time. [Title 17 CCR §93115.10(e)(1)]. District and State Only

Verification: At least thirty (30) days prior to the installation of each engine, the project owner shall provide the District and the CPM the specification of the hour timer.

AQ-38 This unit shall not be used to provide power during a voluntary power outage and/or power reduction initiated under an Interruptible Service Contract (ISC), Demand Response Program (DRP), Load Reduction Program (LRP) and/or similar arrangement(s) with the electrical power supplier. [17 CCR 93115] [40 CFR 60 Subpart IIII allowance for DRP streamlined out.]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-39 This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 0.5 hrs per day for a total of 50 hours per year for testing and maintenance. [NSR and 17 CCR 93115] [Hours allowed by 60.42(f) streamlined out.]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-40 The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request. The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);
b. Reason for use (testing & maintenance, emergency, required emission testing, etc.);
c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR 93115]; and,
d. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log.) [17 CCR 93115]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-41 This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (17 CCR §93115) and 40 CFR Part 60, Subpart IIII (NSPS). In the event of conflict between these conditions and the ATCM or NSPS, the more stringent requirements shall govern.

Verification: The project owner shall submit to the District and the CPM the engine specifications at least 30 days prior to purchasing the engines for review and approval demonstrating that the engines meet the ATCM and NSPS emission limit requirements at the time of engine purchase.

***CONDITIONS APPLICABLE TO THE COMMON AREA EMERGENCY FIRE PUMP, MDAQMD APPLICATION NUMBERS/PERMIT NUMBERS; MD100000062 (E011547)*, consisting of:**

Year of Manufacture TBD, Tier III; Located in the Common Logistics Area; One Clarke (or equiv., Diesel fired internal combustion engine Model No. JU4H-UFAD4G (or equiv.) and Serial No. tbd_, Direct Injected, producing 106.5 bhp with 4 cylinders at 1760 rpm while consuming a maximum of 8.5 gal/hr.

AQ-42 This engine, certified in accordance with 40 CFR Part 89, and after treatment control device (if any) shall be installed, operated and maintained according to the manufacturer's emission-related written instructions. Further, the owner/operator shall change only those emission-related settings that are permitted by the manufacturer. Unless otherwise noted, this equipment shall also be operated in accordance with all data and specifications submitted with the

application for this permit. [40 CFR Part 60 Subparts 60.4205 and 60.4211]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-43 This unit shall only be fired on ultra-low sulfur diesel fuel, whose sulfur concentration is less than or equal to 0.0015% (15ppm) on a weight per weight basis per CARB Diesel or equivalent requirements. [17 CCR 93115; 60.4207(b)]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-44 A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed and maintained on this unit to indicate elapsed engine operating time. [Title 17 CCR §93115.10(e)(1)]. District and State Only

Verification: At least thirty (30) days prior to the installation of the engine, the project owner shall provide the District and the CPM the specification of the hour timer.

AQ-45 This unit shall be limited to use for emergency power, defined as in response to a fire or when commercially available power has been interrupted. In addition, this unit shall be operated no more than 0.5 hrs per day for a total of 50 hours per year for testing and maintenance. The 50 hour limit can be exceeded when the emergency fire pump assembly is driven directly by a stationary diesel fueled CI engine operated per and in accord with the National Fire Protection Association (NFPA) 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," 1998 edition. This requirement includes usage during emergencies. [[District Rule 1302(C)(2)(a) and Rule 1304 (D)(1)(a)] and 17 CCR 93115.3(n)] [Hours allowed by federal regulation 40 CFR 60.42(f) streamlined out as these permit requirements are more stringent than the federal regulatory requirements.]

Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.

AQ-46 The owner/operator shall maintain an operations log for this unit current and on-site (or at a central location) for a minimum of five (5) years, and this log shall be provided to District, State and Federal personnel upon request.

The log shall include, at a minimum, the information specified below:

a. Date of each use and duration of each use (in hours);

b. Reason for use (testing & maintenance, emergency, required emission testing, etc.);

c. Monthly and calendar year operation in terms of fuel consumption (in gallons) and total hours [17 CCR93115]; and,

d. Fuel sulfur concentration (the o/o may use the supplier's certification of sulfur content if it is maintained as part of this log.) [17 CCR 93115]

Verification: **During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.**

AQ-47 **These engines may operate in response to fire suppression requirements and needs. [Rule 204]**

Verification: **During site inspection, the project owner shall make all records and reports available to the District, ARB, U.S. EPA or CEC staff.**

AQ-48 **This unit is subject to the requirements of the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines (17 CCR §93115) and 40 CFR Part 60, Subpart IIII (NSPS). In the event of conflict between these conditions and the ATCM or NSPS, the more stringent requirements shall govern.**

Verification: **The project owner shall submit to the District and the CPM the engine specifications at least 30 days prior to purchasing the engines for review and approval demonstrating that the engines meet the ATCM and NSPS emission limit requirements at the time of engine purchase.**

REFERENCES

ARB 2011, California Air Resources Board, Air Designation Maps available on ARB website. http://www.arb.ca.gov/desig/adm/adm.htm. Accessed 2012.

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BSE 2010, Bright Source Energy/ Solar Partners I, LLC/ Biological Mitigation Proposal (Mitigated Ivanpah 3) for Ivanpah Solar Electric Generating System (ISEGS) (07-AFC-5) Dated 2/11/10, Submitted to CEC 2/11/10.

CEC 2009 – California Energy Commission. Final Staff Assessment and Draft Environmental Impact Statement and Draft California Desert Conservation Area Plan Amendment for Ivanpah Solar Electric Generating System (07-AFC-5) CEC-700-2008.013-FSA-DEIS. Dated October 2009. Submitted to CEC / Docket Unit on 11/04/09.

CEC 2010a, California Energy Commission, Final Staff Assessment Addendum, Ivanpah Solar Electric Generating System (07-AFC-5), March 2010.

CEC 2010b, California Energy Commission, Ivanpah Solar Electric Generating System (07-AFC-5) Commission Decision, September 2010.

CH2MHILL 2012, Petition to Amend No. 1, Reduction in Air Emissions for the Ivanpah Solar Electric Generating System, February 2012.

MDAQMD 2010, Mojave Desert Air Quality Management District, Final Decision/Determination Ivanpah Solar Electric Generating System Rev C, April 15, 2010.

MDAQMD 2012a, Mojave Desert Air Quality Management District, Final Decision/Determination Ivanpah Solar Electric Generating System Rev D, October 5, 2012.

MDAQMD 2012b, Mojave Desert Air Quality Management District, Final Decision/Determination Ivanpah Solar Electric Generating System Rev E, November 1, 2012.

Sierra 2012, Sierra Research, Letter to Mojave Desert Air Quality Management District: Ivanpah Solar Electric Generating System Compliance with the One-Hour NO_2 NAAQS, May 11, 2012.

U.S. EPA 2011, U.S. Environmental Protection Agency, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard, March 11, 2011.

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U.S. EPA 2012b, U.S. Environmental Protection Agency, AirData database ambient air quality data. http://www.epa.gov/airdata. Accessed 2012.

APPENDIX AIR-1 - GREENHOUSE GAS EMISSIONS

Petition to Amend No.1

Wenjun Qian, Ph.D.

SUMMARY OF CONCLUSIONS

Staff finds that the proposed changes to the Ivanpah Solar Electric Generating System (ISEGS or project) would result in a net reduction in greenhouse gas (GHG) emissions across the electricity system providing energy and capacity to California. Thus, staff concludes that the project would result in a cumulative overall reduction in GHG emissions from power plants, would not worsen current conditions, and would not result in impacts that are cumulatively CEQA significant. The ISEGS project, as a solar project with a nightly shutdown, would operate at less than 60 percent of capacity factor and is therefore not subject to the requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2900 et. seq.). Nonetheless, the ISEGS project would easily comply with the requirements of SB 1368 and the Greenhouse Gas Emission Performance Standard.

INTRODUCTION

On March 8, 2012, the California Energy Commission (Energy Commission) received an amendment petition from Solar Partners I, LLC, Solar Partners II, LLC, and Solar Partners VIII, LLC (Solar Partners or project owner) to modify the certification for Ivanpah Solar Electric Generating System (ISEGS or project) (07-AFC-05C). The project was originally certified by the CEC on September 22, 2010 (CEC 2010b) as three units that would generate a total of 370 megawatts (MW). Project construction commenced, and is still underway. The project owner reviewed the project design and proposes to make several minor changes to the original project description that would be beneficial to efficient and effective operation of the project. The amendment request would:

- Provide additional operating flexibility for the three auxiliary boilers (one for each unit) by increasing the maximum allowable daily hours of operation (without increasing allowable annual hours of operation);
- Increase the nominal size of each of the three auxiliary boilers from 231.1 MMBtu/hr to 249 MMBtu/hr;
- Move each auxiliary boiler approximately 30 feet from the location shown in AFC drawings;
- Add three small natural gas-fired nighttime preservation boilers (one for each unit, no larger than 10 MMBtu/hr each);
- Reduce the size of three emergency generators (one for each unit) from 2,500 kW each to 1,500 kW each;
- Add a 250 kW emergency engine in the common area;
- Add a 106.5 hp diesel fire pump engine in the common area; and
- Replace auxiliary dry cooling systems with wet surface air condenser.

In this analysis, staff evaluated the expected GHG emissions from the modified project.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS) COMPLIANCE

The Commission Decision certifying the ISEGS project concluded that the project is in compliance with all applicable laws, ordinances, regulations and standards (LORS). The project, as modified, is subject to all the applicable LORS in the October 2009 Final Staff Assessment (FSA) (CEC 2009) and March 2010 Final Staff Assessment Addendum (CEC 2010a).

ANALYSIS

Greenhouse Gas Table 1 compares the GHG emissions as permitted in the Commission Decision (CEC 2010b) and new GHG emissions based on the proposed changes in the project (CH2MHILL 2012).

The project owner requests an increase in the size and maximum daily usage of the auxiliary boilers. The project owner also requests the addition of three nighttime preservation boilers, one for each unit. These changes would increase the maximum daily fuel usage which would increase the maximum daily GHG emissions. However, the project owner is not requesting an increase in annual fuel usage, which is limited by two conditions: **AQ-SC10** limits annual fuel use in the boilers in each solar facility to 5 percent of the total solar thermal input and **AQ-12** limits fuel use in the boilers in each solar facility to 328 MMSCF in any calendar year. Thus, the annual GHG emissions from the boilers would be the same with the proposed changes to the project.

The project owner proposes to reduce the size of the emergency generator engines in the power blocks and to add a small emergency generator engine in the common area. The cumulative total annual GHG emissions from these proposed changes would be lower than the currently-permitted GHG emissions. This amendment also includes addition of a small emergency fire pump engine in the common area. There would be a small increase in the total annual GHG emissions from the additional fire pump. The facility owner is also proposing changes to the cooling systems as explained in the Air Quality Section above. However, the changes to the cooling systems would not affect GHG emissions. GHG emissions from other emission sources listed in the **Greenhouse Gas Table 1** are kept the same.

The total project GHG emissions based on the proposed project changes (25,269 Metric Tonne Carbon Dioxide Equivalent [MTCO2E] per year) would be slightly lower than the permitted GHG emissions (25,359 MTCO2E per year). This result is expressed in "MTCO2E" because it incorporates both carbon dioxide and the other greenhouse gases. The facility GHG emission rate would be 0.028 MTCO2E/MWh with the proposed project changes instead of the permitted level of 0.029 MTCO2E/MWh. Although the GHG emissions reported here include all GHGs as expressed by the "equivalent" term, the GHG emissions performance standard is normally applied only to the carbon dioxide fraction, and would be slightly lower since carbon dioxide makes up the bulk of the total GHGs expressed in GHG-equivalents.

As a solar project with a nightly shutdown that would operate at less than 60 percent of capacity, ISEGS is not subject to the requirements of SB 1368 (Chapter 11, Greenhouse Gases Emission Performance Standard, Article 1, Section 2900 et. seq.). Nonetheless, the ISEGS project would easily comply with the requirements of SB 1368 Greenhouse Gas Emission Performance Standard of 0.5 MTCO2/MWh, if it applied.

Greenhouse Gas Table 1
ISEGS Operating Greenhouse Gas Emissions

	Permitted CO_2-equivalent (MTCO2E per year)	**New CO_2-equivalent (MTCO2E per year)**
Boilers (no change)	23,549	23,549
Emergency Generator Engines	260	166
Fire Pump Engines	15	19
Maintenance Vehicles (no change)	385	385
Worker Vehicles (no change)	1,118	1,118
Delivery and Waste Haul Vehicles (no change)	22	22
Equipment Leakage (SF_6) (no change)	10	10
Total Project GHG Emissions - MTCO2E	25,359	25,269
Facility MWh per year (no change)	888,000	888,000
Facility GHG Emission Rate (MTCO2E/MWh) [1]	0.029	0.028

Source: CEC 2010b, CH2MHILL 2012

Note: 1. This result is reported in carbon dioxide-equivalents although the GHG Emissions Performance Standard is for carbon dioxide, which would be slightly lower. However, staff did not have the information needed to report only the carbon dioxide portion and the reported value is well below this limit.

CUMULATIVE IMPACTS

The cumulative impacts of the project were evaluated in the October 2009 FSA (CEC 2009). While ISEGS would emit some GHG emissions, ISEGS's contribution to the system build-out of renewable resources in California would result in a net cumulative reduction of GHG emissions from new and existing fossil resources. The annual GHG emissions from the proposed changes in the project would result in even lower GHG emissions than those permitted in the Commission Decision.

The annual GHG emissions may trigger mandatory reporting of GHG emissions. Federal mandatory GHG reporting requirements apply only to stationary emissions sources. These emissions would be reduced from 23,834 MTCO2E per year from the stationary sources for the previous configuration to 23,744 MTCO2E per year for the modified configuration and federal mandatory GHG reporting is not likely to be required. However, California Air Resources Board requires facilities with annual GHG emissions of at least 10,000 MTCO2E to report their annual emissions, but they may use

abbreviated reporting as described in California Code of Regulations Section 95103 (a) as long as their emissions are less than 25,000 MTCO2E.

ARB's Cap-and-Trade requirements apply to facilities whose emissions equal or exceed 25,000 MTCO2E, and based upon GHG Table 1, Cap-and-Trade requirements may not apply to this facility. However, if required, the facility would be required to acquire GHG emissions allocations to comply with the requirements of the Global Warming Solutions Act. If so, the project would be part of a programmatic approach to meeting GHG reduction requirements, as well as helping to meet California's renewable portfolio goals. Thus, staff believes that the modified project would result in a cumulative overall reduction in GHG emissions from power plants, does not worsen current conditions, and would not result in impacts that are cumulatively significant.

CONCLUSIONS AND RECOMMENDATIONS

The requested project changes would comply with applicable Federal, State, and MDAQMD air quality laws, ordinances, regulations, and standards related to greenhouse gas emissions. The amended project would decrease the annual GHG emissions and would not result in impacts that are cumulatively CEQA significant.

PROPOSED MODIFICATIONS TO CONDITIONS OF CERTIFICATION

No Conditions of Certification related to Greenhouse Gas emissions are in the Commission Decision. The project owner would comply with any future applicable GHG regulations formulated by the ARB, such as GHG reporting or emissions cap and trade markets.

REFERENCES

CEC 2009 – California Energy Commission. Final Staff Assessment and Draft Environmental Impact Statement and Draft California Desert Conservation Area Plan Amendment for Ivanpah Solar Electric Generating System (07-AFC-5) CEC-700-2008.013-FSA-DEIS. Dated October 2009. Submitted to CEC / Docket Unit on 11/04/09.

CEC 2010a – California Energy Commission, Final Staff Assessment Addendum, Ivanpah Solar Electric Generating System (07-AFC-5), March 2010.

CEC 2010b – California Energy Commission, Ivanpah Solar Electric Generating System (07-AFC-5) Commission Decision, September 2010.

CH2MHILL 2012, Petition to Amend No. 1, Reduction in Air Emissions for the Ivanpah Solar Electric Generating System, February 2012.