APPLICANT RESPONSES TO CALIFORNIA ENERGY COMMISSION AND ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE PRELIMINARY DETERMINATION OF COMPLIANCE FOR THE HYDROGEN ENERGY CALIFORNIA (HECA) PROJECT (08-AFC-8)

Prepared for:

San Joaquin Valley Air Pollution Control District

Project Number S-1093741

Kern County, CA

Prepared on behalf of:

Hydrogen Energy California LLC

September 14, 2010

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APPLICANT RESPONSES TO CEC AND EPA COMMENTS ON THE JUNE 21, 2010 SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT PRELIMINARY DETERMINATION OF COMPLIANCE

ATTACHMENTS

LIST OF ACRONYMS AND ABBREVIATIONS USED IN RESPONSES

ATC	Authority to Construct
BACT	Best Available Control Technology
BTU	British Thermal Unit
CARB	California Air Resources Board
CEC	California Energy Commission
CEIDARS	California Emission Inventory Data and Reporting System
CO	carbon monoxide
CO_2	carbon dioxide
CTG	combustion-turbine generator
GE	General Electric
GEP	Good Engineering Practice
HECA LLC	Hydrogen Energy California LLC
HECA	Hydrogen Energy California
HRSG	heat-recovery steam generator
IGCC	integrated gasification combined-cycle
lb/hr	pounds per hour
m	meters
NO_x	nitrogen oxides
PDOC	Preliminary Determination of Compliance
PM	particulate matter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
SCAQMD	South Coast Air Quality Management District
SCR	selective catalytic reduction
SJVAPCD	San Joaquin Valley Air Pollution Control District
EPA	Environmental Protection Agency
VOC	volatile organic compound

INTRODUCTION

The Hydrogen Energy California (HECA) Project will produce low-carbon baseload electricity by capturing carbon dioxide (CO_2) and transporting it for enhanced oil recovery (EOR) and sequestration. The Project will gasify petroleum coke (petcoke) (or blends of petcoke and coal, as needed) to produce raw syngas and ultimately hydrogen to fuel a combustion turbine operating in combined cycle mode. The net electrical generation output from the Project will provide California with approximately 250 MW of low-carbon baseload power to the grid. The Gasification Block will also capture approximately 90 percent of the carbon from the raw syngas at steady-state operation, which will be transported to the Elk Hills Field for CO_2 EOR and sequestration. The Project will have significantly lower criteria pollutant emissions than a similarly sized petcoke-fired, coal-fired or integrated gasification combined-cycle (IGCC) power plant. To minimize air emissions, state-of-the art emission control technologies will be implemented for the HECA Project.

On June 26, 2009, HECA LLC (or the Applicant) submitted an application for an Authority to Construct (ATC) permit to San Joaquin Valley Air Pollution Control District (SJVAPCD). This application was deemed complete by SJVAPCD on August 3, 2009, and was assigned SJVAPCD Project Number S-1093741.

On June 21, 2010, SJVAPCD issued a Preliminary Determination of Compliance (PDOC) for public review and comment. The California Energy Commission (CEC) issued comments on the PDOC on August 3, 2010. Environmental Protection Agency (EPA) Region IX issued comments on the PDOC on August 16, 2010.

This document presents the Applicant's responses to the CEC's and EPA's comments on the PDOC.

RESPONSES TO CEC COMMENTS

CEC COMMENT

1. Stack Heights and Good Engineering Practice: The PDOC specifically notes the stack height for the CO2 Vent exceeds the de-minimis good engineering practice (GEP) height of 65 meters, but does not indicate either in the engineering evaluation discussion on page 20 or in the Air Quality Impact Analysis (AQIA) (Appendix H) whether and how this stack or all of the other proposed stacks that are above the de-minimis height meet GEP regulation requirements. This question about compliance with GEP stack height concerns all of the following:

Emissions Stack	*Height (meters)*
CO2 Vent	***79.2***
SRU Flare	***76.2***
Gasification Flare	***76.2***
Rectisol Flare	***76.2***

Staff believes that a brief note regarding compliance with GEP stack height should be added to the FDOC to complete the discussion regarding these sources/stacks.

RESPONSE

Good engineering practice (GEP) is defined as the height necessary to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, or wakes that may be created by the source itself, nearby structures, or nearby terrain obstacles.[1]

The Building Profile Input Program Plume Rise Model Enhancements building downwash model was run to determine the GEP height for each stack. The output of this model shows that the GEP for the three flares and the carbon dioxide (CO_2) vent is 152.4 meters (m). This file was provided to SJVAPCD with the other air quality modeling files.

GEP is calculated based on the following equation

$$H_g = H + 1.5 * L$$

Where: H_g = GEP stack height (m)

H = height of the nearby structure (m)
L = lesser dimension of the height or projected width of the nearby structure (m)

The largest nearby structure is the gasifier building, which is 60.96 m high and 70.9 m long. Therefore, L = 60.96 m, H = 60.96 m, and H_g = 152.4 m.

The gasifier building is within five times L (3,048 m) from the three flares and the CO_2 vent; therefore, GEP for these stacks is calculated based on the gasifier building dimensions. The heights of the three flares and the CO_2 vent are thus well below the GEP height of 152.4 m.

[1] Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations), EPA-450/4-80-023R, June 1985.

CEC COMMENT

2. Combined Cycle Combustion Turbine Generator (S-7616-9) Particulate Emissions: ***The particulate matter (PM10/PM2.5) emission levels requested by the applicant for this emission unit are well above similar gas turbine emission rate limits considering fuel firing heat input levels. The applicant has not provided compelling technical rationale to explain why this gas turbine would need a particulate matter (PM) emission rate that is so much higher than other similar gas turbines, and staff believes that the other recently permitted turbine projects have established a reasonable Best Available Control Technology (BACT) emissions level, which based on staff's review of available source test data generally provides a 50 percent safety factor (i.e., actual emissions are generally no more than half the allowable emissions, which for example would mean that the expected actual PM emissions for the Carlsbad project turbines would be somewhere between 4 to 5 lbs/hour, or about half of the allowable 9.5 lbs/hour). A comparison of the estimated HECA-proposed PM emissions compared to similar, recently approved and on-going projects are as follows:***

Project	***Gas Turbine***	***Lb/hr***	***Lb/ MMBtu***	***Lb/MW gross***
HECA – H_2 Fuel	*GE 7FB*	*18 (19.8)*	*0.0084 (0.0079)*	*(0.051) (0.051)*
HECA – Natural Gas		*18 (19.8)*	*0.0090 (0.0078)*	*0.066 (0.060)*
Allowable Emissions on Natural Gas:				
Avenal	*GE 7FA*	*8.91 (11.78)*	*0.0050 (0.0052)*	*0.034 (0.039)*
Inland Empire	*GE 107H*	*10*	*0.0040*	*0.026*
Carlsbad	*Siemens SGT6-PAC5000F*	*9.5*	*0.0046*	*0.034*
Value in "()" is duct firing value for projects with duct burners.				

Staff believes that the District should consider reducing the Particulate Matter (PM10/PM2.5) emission rate down to no more than 15 lbs/hour without duct firing and 16.8 lbs/hour with duct firing as BACT emission rates. These rates should provide an adequate safety margin compared to expected actual emissions and would also serve to reduce the total permitted annual PM2.5 emission rate to a level where the PM2.5 fraction of the cooling tower emissions are no longer an issue in regards to the potential for the site to exceed 100 tons per year of PM2.5 emissions, which would trigger the need for the project to obtain federal PM2.5 offsets.

RESPONSE

The Applicant is requesting additional time to address this comment.

CEC COMMENT

3. Cooling Tower PM2.5 Fraction Assumption: Staff believes that the rationale used by the applicant for the ratio of particulate matter less than 2.5 microns (PM2.5) to particulate matter less than 10 microns (PM10) of 0.6:1 for the cooling tower emissions is flawed. The rationale provided by the applicant notes that this ratio is cited in the South Coast Air Quality Management District's (SCAQMD's) particulate size fraction in the California Emission Inventory Development and Reporting System (CEIDARS) table from the SCAQMD CEQA website. However, the CEIDARS particulate size fraction data was originally produced by the California Air Resource Board (ARB) and review of the original CEIDARS particulate size fraction table from ARB shows that there is no cooling tower category and that the "other" category values have been used by SCAQMD in lieu of other available data for cooling towers in their version of the CEIDARS table. This shows that this particulate size fraction data is not specific to cooling towers and is not technically supportable. Staff is willing to accept a defendable cooling tower particulate size fraction reference; however, to date staff is not aware of such a defendable reference. Staff believes that the District should investigate this further and if possible provide a more technically defensible particulate size fraction reference and revise the cooling tower particulate matter (PM10 and PM2.5) emissions appropriately. If no specific particulate size fraction data reference for cooling towers is available, the District should assume 100 percent of the PM10 is PM2.5.

RESPONSE

The cooling tower total PM emissions are based on the maximum expected total dissolved solids in the cooling water, annual circulating water rate, and the use of a high-efficiency drift eliminator. The Applicant conservatively estimated that total PM emitted from the cooling tower will be equal to PM_{10} in diameter, and the quantity of PM emissions that are equal to $PM_{2.5}$ will be 60 percent of the PM_{10} emissions (a fraction or ratio of 0.6). This ratio used by the Applicant is based on the several justifications described below.

1. The "South Coast Air Quality Management District (SCAQMD) – Final Methodology to Calculate $PM_{2.5}$ and $PM_{2.5}$ Significance Thresholds, Appendix A – Updated California Emission Inventory Data and Reporting System (CEIDARS) Table with $PM_{2.5}$ Fractions[2]" provides the cooling tower ratios of 0.7 for the PM_{10} fraction of total PM, 0.6 for the $PM_{2.5}$ fraction of PM_{10}, and 0.42 for the $PM_{2.5}$ fraction of total PM. The Applicant consulted with SCAQMD staff and confirmed these PM size fractions were derived from PM profiles in the CEIDARS developed by the California Air Resources Board (CARB). The Applicant also confirmed that SCAQMD examined carefully, approved, and officially adopted this document in October 2006. Since then, SCAQMD has required all California Environmental Quality Act/National Environmental Policy Act projects to use this methodology and its PM size fractions to estimate their PM, PM_{10}, and $PM_{2.5}$ emissions from cooling towers. Therefore, the use of the 0.6 ratio of $PM_{2.5}$ to PM_{10} provided by this SCAQMD document is valid for estimating the HECA Project cooling tower $PM_{2.5}$ emissions, although the $PM_{2.5}$ emissions will be

[2] Final Methodology to Calculate $PM_{2.5}$ and $PM_{2.5}$ Significance Thresholds (October 2006) from http://www.aqmd.gov/ceqa/handbook/PM2_5/finalmeth.doc; and its Appendix A – Updated CEIDARS Table with $PM_{2.5}$ Fractions from http://www.aqmd.gov/ceqa/handbook/PM2_5/finalAppA.doc.

overestimated due to the assumption that all PM emissions are comprised of PM_{10}.

2. The Applicant conducted a query for cooling towers in California on the CEIDARS[3]. The query results show that all of the cooling towers from different source categories in California in 1995, 2000, 2005, and 2008 have an average $PM_{2.5}$-to-PM_{10} ratio of 0.636, and an average $PM_{2.5}$–to-PM ratio of 0.441 (see Attachment CEC-3-1). In addition, the Applicant, with assistance from CARB emission inventory staff (Gabe Ruiz and Darryl Look), gathered all the California power plant cooling tower emissions from CEIDARS (see Attachment CEC-3-2). Because only PM emissions were measured, $PM_{2.5}$ emissions are estimated from PM emissions. Attachment CEC-3-2 and Applicant discussions with CARB staff confirmed that the 0.7/0.6/0.42 PM/PM_{10}/$PM_{2.5}$ ratios were applied to most of the power plant cooling tower emission estimates. The average $PM_{2.5}$ fraction of PM_{10} is 0.633, and the average $PM_{2.5}$ fraction of PM is 0.478 for all power plant cooling towers in California. The $PM_{2.5}$ fractions of PM_{10} from the CEIDARS database for cooling towers from power plant cooling towers and from different source categories are very similar to the fraction the Applicant used in its cooling tower $PM_{2.5}$ emissions estimations. Therefore, in calculating the cooling tower PM emissions, the Applicant has accurately presented the $PM_{2.5}$ portion of PM_{10} emissions, and furthermore, by assuming 100 percent of the total PM emissions to be PM_{10}, the Applicant has significantly overestimated the $PM_{2.5}$ emissions.

3. The assumption that 100 percent of the PM emitted from a cooling tower is smaller than 2.5 microns is too conservative from a technical perspective. The drift droplets generally contain the chemical impurities (or minerals) in the water circulating through the tower, and these impurities can be converted to airborne emissions. There are currently few papers about PM_{10}/$PM_{2.5}$ emission factors for mechanical draft cooling tower processes. One good reference[4] from Joel Reisman and Gorden Frisbie confirms the point that only a small amount of the circulating water may be entrained in the air stream, and it appears that most of the particles emitted from the cooling tower are larger than PM_{10}. According to the conclusion of this paper, 85 percent of the mass that is emitted is larger than 10 microns, and only 15 percent is less than 10 microns. The Applicant also consulted with EPA Staff (J. David Mobley, Deputy Director, Atmospheric Modeling and Analysis Division, National Exposure Research Laboratory; Lee Beck, Senior Project Engineer, Emissions Characterization & Prevention Branch, Air Pollution Prevention and Control Division), and the staff agree with the methodology and conclusion of this paper.

4. It should be reiterated that the PM_{10} emissions from the cooling towers at HECA were estimated using U.S. EPA's AP-42 guidance[5] that conservatively assumes that all dissolved solids in the circulating water will be converted to airborne PM_{10}. The AP-42 document states " a *conservatively high* PM_{10} emission factor can be obtained by (a) multiplying the total liquid drift factor by the total dissolved solids (TDS) fraction in the circulating water and (b) assuming that, once the water

[3] CARB Emission Inventory Database (California Emission Inventory Development and Reporting System, CEIDARS) from http://www.arb.ca.gov/app/emsinv/emssumcat.php.

[4] Reisman, J. and Frisbie, G. (2002), Calculating realistic PM_{10} emissions from cooling towers. Environmental Progress, 21: 127–130. doi: 10.1002/ep.670210216.

[5] AP-42, CH 13.4: Wet Cooling Towers: (http://www.EPA.gov/ttnchie1/ap42/ch13/final/c13s04.pdf).

evaporates, all remaining solid particles are within the PM_{10} size range." This U.S. EPA guidance clearly describes that cooling tower emissions of PM_{10}, and thus $PM_{2.5}$, that are calculated with this technique are overestimated.

5. Data from the 2006 Micheletti study, "Atmospheric Emissions from Evaporative Cooling Towers"[6], confirm that the assumption that of all the particulate emissions are PM_{10} is an exaggeration. Mr. Micheletti calculated PM_{10} and $PM_{2.5}$ emission factors that are at least an order of magnitude less than the small particulate emissions that would be calculated using the U.S. EPA's conservatively high method. Even when Mr. Micheletti adjusted the U.S. EPA particulate emission factor for changes in drift rate and recirculating water TDS concentration, he calculated PM_{10} and $PM_{2.5}$ emission factors that are noticeably lower (see Attachment CEC-3-3). He determined that the fatal flaw in the U.S. EPA's method is the assumption that all of the total dissolved solids in the drift become PM_{10} or $PM_{2.5}$.

6. The CEC commissioned a study[7] of environmental effect from saltwater cooling towers. Although the focus of this study was the effects from saltwater cooling towers, some of the data are derived from non-saltwater cooling towers. The CEC study references the Micheletti study and agrees with the conclusion that "only a small fraction (less than 15%) of the residual particles will have an aerodynamic diameter of less than 10 microns", although they warn there may be uncertainties in the calculations. This study shows that the CEC believes that significantly less than 100% of the particulate matter emitted from cooling towers is PM_{10} and $PM_{2.5}$.

Compliance with the PM emissions from the cooling tower will be demonstrated through PDOC Conditions 14 and 15.

Based on the data presented above, in the ATC application, in the response to CEC Data Request 18, and presented by SJVAPCD in the PDOC, the Applicant conservatively assumed all PM emissions were 10 microns or smaller and 60 percent of those emissions were 2.5 microns or smaller. In addition, the Applicant overestimated the PM_{10} emissions by assuming that all PM is 10 microns or smaller. The Applicant believes the evaluation of the $PM_{2.5}$ emissions from the cooling tower presented in the PDOC is valid, and no change to the PDOC is warranted for the cooling tower $PM_{2.5}$ emissions.

[6] Micheletti, W.C., 2006. "Atmospheric Emissions from Evaporative Cooling Towers." CTI Journal. Vol. 27, No. 1.
[7] CEC, Performance, Cost, And Environmental Effects Of Saltwater Cooling Towers, January 2010, CEC-500-2008-043.

ATTACHMENT CEC-3-1

ATTACHMENT CEC-3-1
CEIDARS DATABASE QUERY for COOLING TOWERS

DATA_SO	YEAR	AREA	SEASON	EMISSION_TYPE	SRC_TYPE	EIC	EICSUMN	EICSOUN	EICMATN	EICSUBN	TOG	ROG	COT	NOX	SOX	PM	PM10	PM2_5	PM2.5 Fraction of Total PM	PM10 Fraction of Total PM	PM2.5 Fraction of PM10
																SCAQMD CIEDARS data base summary			0.420	0.700	0.600
2009_Alma	2008	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	430-338-0	MINERAL PROCESSES	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0002	0.0001	0.0001	0.500	0.500	1.000
2009_Alma	2008	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	420-338-0	FOOD AND AGRICULTURE	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.1638	0.1146	0.0689	0.421	0.700	0.601
2009_Alma	2008	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	410-338-0	CHEMICAL	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0.0138	0.0096	0	0	0	0.1142	0.08	0.0479	0.419	0.701	0.599
2009_Alma	2008	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	320-338-0	PETROLEUM REFINING	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	2.1388	2.0747	0	0	0	2.2645	1.4118	1.2111	0.535	0.623	0.858
2009_Alma	2008	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	499-338-0	OTHER (INDUSTRIAL PROCESSES)	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0.0194	0.0136	0	0	0	0.9743	0.6836	0.4095	0.420	0.702	0.599
2009_Alma	2008	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	470-338-0	ELECTRONICS	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0201	0.0142	0.0084	0.418	0.706	0.592
2009_Alma	2008	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	460-338-0	GLASS AND RELATED PRODUCTS	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0336	0.0235	0.0141	0.420	0.699	0.600
2009_Alma	2008	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	450-338-0	WOOD AND PAPER	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0034	0.0025	0.0014	0.412	0.735	0.560
2009_Alma	2008	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	440-338-0	METAL PROCESSES	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.1705	0.1194	0.0716	0.420	0.700	0.600
																			0.440	**0.674**	**0.668**
2009_Alma	2005	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	499-338-0	OTHER (INDUSTRIAL PROCESSES)	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0.0136	0.0096	0	0	0	0.1477	0.1046	0.0621	0.420	0.708	0.594
2009_Alma	2005	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	470-338-0	ELECTRONICS	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.009	0.0063	0.0037	0.411	0.700	0.587
2009_Alma	2005	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	420-338-0	FOOD AND AGRICULTURE	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0094	0.0066	0.004	0.426	0.702	0.606
2009_Alma	2005	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	320-338-0	PETROLEUM REFINING	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	2.658	2.617	0	0	0	0.3166	0.1931	0.1757	0.555	0.610	0.910
2009_Alma	2005	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	410-338-0	CHEMICAL	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0.0042	0.0029	0	0	0	0	0	0			
2009_Alma	2005	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	310-338-0	OIL AND GAS PRODUCTION	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0072	0.0044	0.004	0.556	0.611	0.909
2009_Alma	2005	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	440-338-0	METAL PROCESSES	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0003	0.0002	0.0001	0.333	0.667	0.500
2009_Alma	2005	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	450-338-0	WOOD AND PAPER	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0071	0.005	0.003	0.423	0.704	0.600
																			0.446	**0.672**	**0.672**
2009_Alma	2000	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	410-338-0	CHEMICAL	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0.0036	0.0025	0	0	0	0.1997	0.1605	0.0839	0.420	0.804	0.523
2009_Alma	2000	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	330-338-0	PETROLEUM MARKETING	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0046	0.0032	0.0019	0.413	0.696	0.594
2009_Alma	2000	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	499-338-0	OTHER (INDUSTRIAL PROCESSES)	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0702	0.0557	0.0303	0.432	0.793	0.544
2009_Alma	2000	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	420-338-0	FOOD AND AGRICULTURE	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0063	0.0059	0.0026	0.413	0.937	0.441
2009_Alma	2000	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	470-338-0	ELECTRONICS	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.005	0.0035	0.0021	0.420	0.700	0.600
2009_Alma	2000	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	460-338-0	GLASS AND RELATED PRODUCTS	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0012	0.0008	0.0005	0.417	0.667	0.625
2009_Alma	2000	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	320-338-0	PETROLEUM REFINING	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	2.1455	2.0528	0	0	0	0.0934	0.057	0.0518	0.555	0.610	0.909
																			0.438	**0.744**	**0.605**
2009_Alma	1995	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	320-338-0	PETROLEUM REFINING	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	2.012	2.012	0	0	0	0.0008	0.0005	0.0004	0.500	0.625	0.800
2009_Alma	1995	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	410-338-0	CHEMICAL	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.2863	0.2475	0.1202	0.420	0.864	0.486
2009_Alma	1995	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	420-338-0	FOOD AND AGRICULTURE	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0047	0.0033	0.002	0.426	0.702	0.606
2009_Alma	1995	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	499-338-0	OTHER (INDUSTRIAL PROCESSES)	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0573	0.0437	0.0241	0.421	0.763	0.551
2009_Alma	1995	Statewide	Annual Ave	Grown and Controlled	STATIONAR'	460-338-0	GLASS AND RELATED PRODUCTS	COOLING TOWERS	HYDROCARBON COI	SUB-CATEGORY UNS	0	0	0	0	0	0.0033	0.0033	0.0014	0.424	1.000	0.424
																			0.438	**0.791**	**0.573**
							OTHER (INDUSTRIAL PROCESSES)											average	0.423	0.741	0.572
																		average all	0.441	0.712	0.636

Source
http://www.arb.ca.gov/app/emsinv/emssumcat.php

ATTACHMENT CEC-3-2

ATTACHMENT CEC-3-2
CEIDARS DATABASE QUERY for POWER PLANT COOLING TOWER EMISSIONS

Cooling Tower PM, PM10, PM2_5 Emissions in tons per year selected by SCC= 38500101

CO	AB	DIS	FACID	FNAME	DEV	PROID	PRDESC	SCC	SCC1N	SCC3N	SCC6N	PM	PM10	PM2_5	PM2.5 Fraction of Total PM	PM10 Fraction of Total PM	PM2.5 Fraction of PM10
33	SC	SC	129816	INLAND EMPIRE ENERGY CENTER, LLC	12	1	800-MW NATURAL GAS-FIRED, COMBINED-CYCLE ELECTRIC GENERATING	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.4	0.28	0.168	0.420	0.700	0.600
33	SC	SC	129816	INLAND EMPIRE ENERGY CENTER, LLC	11	1	800-MW NATURAL GAS-FIRED, COMBINED-CYCLE ELECTRIC GENERATING	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.64	0.448	0.2688	0.420	0.700	0.600
36	MD	MOJ	104701849	HIGH DESERT POWER PROJECT	17	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.412	0.288365	0.173	0.420	0.700	0.600
34	SV	SAC	193	CARSON ENERGY/SMUD	3	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.762635714	0.533845	0.320307	0.420	0.700	0.600
36	MD	MOJ	104701849	HIGH DESERT POWER PROJECT	11	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.412	0.288365	0.173	0.420	0.700	0.600
34	SV	SAC	3456	SMUD COSUMNES POWER PLANT	3	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	1.843171429	1.29022	0.774132	0.420	0.700	0.600
36	MD	MOJ	104701849	HIGH DESERT POWER PROJECT	15	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.412	0.288365	0.173	0.420	0.700	0.600
34	SV	SAC	195	SACRAMENTO COGENERATION AUTHOY	4	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	1.247725	1.247725	0.5240445	0.420	1.000	0.420
36	MD	MOJ	104701849	HIGH DESERT POWER PROJECT	9	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.412	0.288365	0.173	0.420	0.700	0.600
36	MD	MOJ	104701849	HIGH DESERT POWER PROJECT	10	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.412	0.288365	0.173	0.420	0.700	0.600
36	MD	MOJ	104701849	HIGH DESERT POWER PROJECT	6	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.371	0.26	0.156	0.420	0.701	0.600
34	SV	SAC	194	SACRAMENTO POWER AUTHORITY	2	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	2.434594643	1.70421625	1.02252975	0.420	0.700	0.600
36	MD	MOJ	104701849	HIGH DESERT POWER PROJECT	13	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.412	0.288365	0.173	0.420	0.700	0.600
36	MD	MOJ	104701849	HIGH DESERT POWER PROJECT	8	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.412	0.288365	0.173	0.420	0.700	0.600
15	SJV	SJU	3523	ELK HILLS POWER LLC	3	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	2.457142637	1.719999846	1.031999908	0.420	0.700	0.600
36	MD	MOJ	104701849	HIGH DESERT POWER PROJECT	12	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.412	0.288365	0.173	0.420	0.700	0.600
36	MD	MOJ	104701849	HIGH DESERT POWER PROJECT	7	7	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.28	0.28	0.168	0.600	1.000	0.600
36	MD	MOJ	104701849	HIGH DESERT POWER PROJECT	16	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.412	0.288365	0.173	0.420	0.700	0.600
36	MD	MOJ	104701849	HIGH DESERT POWER PROJECT	14	1	COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.412	0.288365	0.173	0.420	0.700	0.600
57	SV	YS	257	WOODLAND BIOMASS POWER LTD	20	1	COOLING TOWER - CIRCULATION RATE	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.014285714	0.01	0.006	0.420	0.700	0.600
19	SC	SC	11034	TRIGEN-LA ENERGY CORP	16	1	DISTRICT HEATING AND COOLING	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	7.12	4.984	2.9904	0.420	0.700	0.600
19	SC	SC	9053	TRIGEN- LA ENERGY CORP	20	1	DISTRICT HEATING AND COOLING	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	1.23	0.861	0.5166	0.420	0.700	0.600
30	SC	SC	9217	TRIGEN-LA ENERGY CORP	3	1	DISTRICT HEATING AND COOLING	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.32	0.224	0.1344	0.420	0.700	0.600
36	MD	MOJ	104801880	RRI ENERGY COOLWATER, LLC.	90011	1	DRIFT CT UNIT 1	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.5997	0.5997	0.5997	1.000	1.000	1.000
36	MD	MOJ	104801880	RRI ENERGY COOLWATER, LLC.	90012	1	DRIFT CT UNIT 2	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.5997	0.5997	0.5997	1.000	1.000	1.000
36	MD	MOJ	104801880	RRI ENERGY COOLWATER, LLC.	90013	1	DRIFT CT UNIT 3	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	6.668	6.668	6.668	1.000	1.000	1.000
36	MD	MOJ	104801880	RRI ENERGY COOLWATER, LLC.	90014	1	DRIFT CT UNIT 4	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	6.668	6.668	6.668	1.000	1.000	1.000
33	SC	SC	68042	CORONA ENERGY PARTNERS, LTD	2	1	ELECTIC POWER AND STEAM COGENERATION FACILITY	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	5.45	3.815	2.289	0.420	0.700	0.600
19	SC	SC	51620	WHEELABRATOR NORWALK ENERGY CO INC	13	1	ELECTRIC POWER GENERATING FACILITY	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	3.16	2.212	1.3272	0.420	0.700	0.600
36	SC	SC	115315	RRI ENERGY ETIWANDA, INC.	1	1	ELECTRIC POWER GENERATION	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	114.16	79.912	47.9472	0.420	0.700	0.600
19	SC	SC	128243	BURBANK CITY,BURBANK WATER & POWER,SCPPA	1	1	ELECTRIC POWER GENERATION	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	1.24	0.868	0.5208	0.420	0.700	0.600
19	SC	SC	25638	BURBANK CITY, BURBANK WATER & POWER	16	1	ELECTRICAL UTILITY POWER PRODUCTION	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	4.15	2.905	1.743	0.420	0.700	0.600
27	NCC	MBU	220	CALPINE KING CITY COGEN, LLC	6	1	PEAKER COOLING TOWER	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.36	0.252	0.1512	0.420	0.700	0.600
19	SC	SC	14502	VERNON CITY, LIGHT & POWER DEPT	1	1	POWER GENERATION	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.85	0.595	0.357	0.420	0.700	0.600
19	SC	SC	800170	LA CITY, DWP HARBOR GENERATING STATION	7	1	POWER PLANT	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.05	0.035	0.021	0.420	0.700	0.600
19	SC	SC	800170	LA CITY, DWP HARBOR GENERATING STATION	5	1	POWER PLANT	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.07	0.049	0.0294	0.420	0.700	0.600
19	SC	SC	800170	LA CITY, DWP HARBOR GENERATING STATION	3	1	POWER PLANT	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.05	0.035	0.021	0.420	0.700	0.600
19	SC	SC	800170	LA CITY, DWP HARBOR GENERATING STATION	4	1	POWER PLANT	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.09	0.063	0.0378	0.420	0.700	0.600
19	SC	SC	800193	LA CITY, DWP VALLEY GENERATING STATION	6	1	POWER PLANT	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.04	0.028	0.0168	0.420	0.700	0.600
19	SC	SC	800170	LA CITY, DWP HARBOR GENERATING STATION	6	1	POWER PLANT	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	0.06	0.042	0.0252	0.420	0.700	0.600
19	SC	SC	800075	LA CITY, DWP SCATTERGOOD GENERATING STN	37	1	POWER PLANT	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	13.01	9.107	5.4642	0.420	0.700	0.600
19	SC	SC	800193	LA CITY, DWP VALLEY GENERATING STATION	7	1	POWER PLANT	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	2.25	1.575	0.945	0.420	0.700	0.600
19	SC	SC	800193	LA CITY, DWP VALLEY GENERATING STATION	8	1	POWER PLANT	38500101	COOLING TOWER	PROCESS COOLING	MECHANICAL DRAFT	9.7	6.79	4.074	0.420	0.700	0.600
														average	**0.478**	**0.742**	**0.633**

ATTACHMENT CEC-3-3

ATTACHMENT CEC-3-3

Calculated PM10 and PM2.5 Cooling Tower Emission Factors as a Function of Recirculating Water TDS

Recirculating Water TDS (ppm)	Maximum Drift Droplet Diameter for PM_{10} Particulates (µm)	Maximum Drift Droplet Diameter for $PM_{2.5}$ Particulates (µm)	Percent Particulate Emissions > 10 µm	Percent Particulate Emissions > 2.5 µm
500	168	41	68%	86%
1000	133	33	73%	88%
2500	86	24	78%	89%
5000	78	19	81%	90%
10000	63	14	83%	90%
20000	49	12	85%	91%
30000	41	11	86%	91%

Source: After Micheletti, W.C., 2006. "Atmospheric Emissions from Evaporative Cooling Towers." CTI Journal. Vol. 27, No. 1.

Notes:

[1] Assumes spherical particulate matter having a density of 2.36 gm/cm^3 and 0.002% drift rate.

CEC COMMENT

4. General Permit Conditions (All Permit Units): The generic permit conditions that start and end the conditions for each permit unit are not provided consistently. For example, the Gasification Flare (S-7616-3-0) starts with 9 general conditions before the unit specific conditions and the Gasification Cooling Tower (S-7616-3-0) starts with five general conditions before the unit specific conditions. Staff believes that most if not all of these general conditions apply for all of the permit units and requests that the District review consistency of the presentation and inclusion of these general permit conditions across the 16 permit units. Staff also requests, if it is possible based on District permitting rules and policies, that these general, facility-wide conditions be separated into one set of conditions that apply to all relevant permit units. This would provide clarity and avoid a sixteen-fold duplication of conditions.

RESPONSE

The Applicant would agree to the CEC recommendation for the conditions.

CEC COMMENT

5. Gasification System (S-7616-2-0) and Sulfur Recovery System (S-7616-5-0) Fugitive VOC Emission Source Inspection and Maintenance Requirements: For later compliance demonstration clarity, staff requests that the conditions for these two permit units include more specificity on what parts of these permit units are subject to Rule 4455 – COMPONENTS AT PETROLEUM REFINERIES, GAS LIQUIDS PROCESSING FACILITIES AND CHEMICAL PLANTS, and that the conditions include the specific requirements of the rule.

RESPONSE

The Applicant would agree to the SJVAPCD adding compliance demonstration conditions.

CEC COMMENT

6. Flares and CO_2 Vent Conditions (S-7616-3-0, S-7616-6-0, S-7616-7-0, and S-7616-8-0) Consistency of Conditions: There are certain general conditions (such as no public nuisance, general design conditions, and recordkeeping conditions) as well as other, more unit specific conditions such as emission rate limits that are applied very differently for these four similar event-based emission sources. While staff notes that different regulations such as federal New Source Performance Standards may apply to all of these sources and would require certain differences in the conditions for these four sources, staff believes that greater consistency in the conditions for these four sources, including conditions noted to be required under District Rule 4311 – FLARES, should be investigated and implemented consistently where appropriate.

RESPONSE

The Applicant would agree to SJVAPCD standardizing the flare conditions, where applicable.

CEC COMMENT

7. CO_2 Vent (S-7616-8-0) Condition 12: Staff requests that the methods and frequency (i.e., required for each venting event) for the vent gas composition monitoring that is required under Condition 12 be detailed in this or other conditions for this permit unit.

RESPONSE

The CO_2 product stream will likely be continuously measured by gas chromatograph for trace constituents. The Applicant intends to use the equipment provided for this purpose to also verify compliance of trace, regulated emissions, as required, during an upset, infrequent CO_2 venting occurrence.

CEC COMMENT

8. Auxiliary Boiler (S-7616-13-0) Conditions 28 and 30: Conditions 28 and 30 appear to be redundant and staff recommends that one be deleted or that they be combined as necessary into a single condition.

RESPONSE

The Applicant would agree to the CEC recommendation for these conditions.

CEC COMMENT

9. Firewater Pump Engine (S-7616-16-0) Conditions 15 and 16: Conditions 15 and 16 appear to be redundant and staff recommends that one be deleted or that they be combined as necessary into a single condition.

RESPONSE

The Applicant would agree to the CEC recommendation for these conditions.

RESPONSES TO EPA COMMENTS

EPA COMMENT

1. <u>Annual Emissions Estimates:</u> Applicable federal requirements include thresholds for defining a major source of criteria pollutant or of hazardous air pollutant (HAP) emissions. For those sources where emission estimates and/or emission limits are relatively close to the federal thresholds, EPA encourages the following: (a) refinement of emissions and compliance demonstration methods that would ensure the thresholds would not be exceeded, and/or (b) a 5-10% buffer between the permitted emission limits and the federal threshold.

We have identified estimated emissions of certain pollutants that are within a margin of less than 5% of the federal annual threshold limits. These limits include the nonattainment of New Source Review (NSR) threshold of 100 tons per year (tpy) for PM2.5 and the major source of Hazardous Air Pollutant (HAP) thresholds of 10 tpy for a single HAP and 25 tpy for cumulative HAP emissions. If the limits of these pollutants are relaxed, the facility would be subject to the applicable federal requirements; for PM2.5, nonattainment New Source Review would be required, and for HAP emissions, evaluation for case-by-case Maximum Available Control Technology (MACT) would be required. Each is further discussed below.

RESPONSE

The response to CEC Comment 3 above provides further discussion regarding the PM emissions from the cooling towers. HECA is requesting additional time to respond to CEC Comment 2 and EPA Comments 1 through 3 regarding the PM emissions from the turbine. The response to EPA Comment 4 below and the responses submitted to the requests for information that EPA issued in April 2010 provides further discussion of the hazardous air pollutant emissions from the CO_2 vent. These discussions include how compliance will be demonstrated.

EPA COMMENT

2. PM2.5 Federal Nonattainment New Source Review (NSR) Applicability: The San Joaquin Valley APCD presents the major source determination for all criteria pollutants on page 62 (Section VII.C.1.) of the engineering evaluation. PM2.5 is estimated at 198,650 pounds per year, or an equivalent of approximately 99.3 tons per year (tpy). As stated by the District in its evaluation, on May 8, 2008 EPA finalized regulations to implement the NSR program for PM2.5. A source that emits or has the potential to emit 100 tpy or more PM2.5 in a non-attainment area is defined as a major stationary source.

The equipment primarily contributing to PM2.5 emissions includes the combined cycle combustion turbine generator (CTG) and the cooling towers; other equipment emitting PM2.5 includes the feedstock handling and combustion-related sources. The District has assumed that all PM10 estimated emissions from the CTG are PM2.5 emissions. The District has assumed that 60% of the PM10 estimated emissions from the cooling towers are PM2.5. If it is determined that the estimated emissions are not representative of the potential-to-emit (PTE) and equal or exceed 100 tpy, the following would also be required: the lowest achievable emission rate control technology and offsetting of PM2.5 emissions with creditable emission reductions.

Please note that in the event that PM2.5 offsets are required and the project proponent were to consider using SO2 reductions to offset the project's PM2.5 emissions, paragraph IV.G.5 of Part 51, Appendix S currently provides that offset requirements for direct PM2.5 emissions under Appendix S may be satisfied by offsetting reductions of emissions of SO2 only "if such offsets comply with an interprecursor trading hierarchy and ratio approved by the Administrator." Moreover, although the provisions concerning trading ratios for interpollutant trading for PM2.5 emissions and other aspects of EPA's PM2.5 NSR Implementation Rule (73 FR 28321 (May 16, 2008)) are currently subject to reconsideration by the Agency (see 74 FR 26098 (June 1, 2009)), the modeling conducted by EPA in the context of development of those ratios supports a significantly higher PM2.5 to SO2 ratio than the 1:1 ratio used by the District for PM10 to SO2 interpollutant trading.

RESPONSE

For a discussion of the cooling tower PM emissions, please see the response to CEC Comment 3 above. The Applicant is requesting additional time to respond to CEC Comment 2 and EPA Comments 1 through 3 regarding the PM emissions from the turbine.

EPA COMMENT

3. Annual Estimates of PM2.5 Emissions and Compliance Demonstration: As noted above, PM2.5 is estimated at 198,650 pounds per year, or an equivalent of approximately 99.3 tons per year (tpy) for the facility operations. (See Page 61, Table titled "Major Source Determination"; see also Appendix F) The equipment primarily contributing to the PM2.5 emissions estimate include the combined cycle combustion turbine generator (CTG) and the cooling towers. The PDOC indicates that these two sources together contribute an estimated 106.4 tpy of PM10 emissions and 96.8 tpy of PM2.5 emissions. The following highlights our comments regarding CTG and cooling tower PM2.5 emission estimates and the respective compliance demonstration methods.

- ***Combustion Turbine Generator (S-7616-9-0) – It is assumed that the PM2.5 emissions from the CTG are equal to the PM10 emissions of 19.8 lbs/hr. EPA supports this assumption. Compliance demonstration for the source testing of PM10 emissions is proposed in Condition 47.***

  However, it is unclear why these estimated emissions are approximately twice what EPA has permitted and/or reviewed for similar CTGs. Given what appears to be additional conservatism in the hourly emissions, EPA requests further discussion in the engineering evaluation regarding the rationale supporting the higher value, as well as consideration of a further reduction of PM10 emission limits based on source test results. For example, has the District considered further reducing the PM10 emission limits presuming source tests demonstrate lower emissions, similar to the approach for NOx, CO and VOC emissions as proposed in Conditions 81-85.

- ***Cooling Towers Emissions (S-7616-4-0, S-7616-11-0, S-7616-2-0) – For all three cooling tower operations, the applicant estimates estimated that the PM2.5 emissions from the cooling towers are 60% of the PM10 emissions. (Additionally, the applicant estimates assumed that all PM emissions are PM10 emissions.) Compliance demonstration for PM10 emissions from this equipment is based on a calculation methodology. This methodology includes a 0.0005% drift rate (representing BACT) from the cooling tower drift eliminator, a total dissolved solids (TDS) concentration not to exceed 9,000 ppm, annual operations limited to 8,322 hours per year, and cooling water circulation rates specific to each operation. (See pages 43-44 of PDOC engineering evaluation.)***

  The applicant has assumed that the 60% PM2.5 size fraction is likely based on the California Air Resources Board (CARB) database information in its California Emission Inventory Development and Reporting System (CEIDARS). This assumption is based on the applicant's use of information from the South Coast Air Quality Management District (SCAQMD). It is our understanding that the SCAQMD has assumed a 60% size fraction, which is based on a CEIDARS value; however, this CEIDARS value is not specific for cooling towers. Therefore, EPA requests further justification of the size fraction of PM2.5 emissions from the cooling towers and/or additional compliance demonstration requirements. Otherwise, it should be assumed

that PM2.5 emissions from the cooling towers are equal to the estimated PM10 emissions.

With respect to the District's proposed compliance demonstration, it appears that the compliance demonstration options that EPA is considering may differ from the District's proposed requirements. We acknowledge that the District is requiring quarterly sampling of the blowdown water to estimate TDS. EPA understands that site-specific data is necessary to determine the correlation between TDS and particulate matter emissions (i.e., PM, PM10, PM2.5). PM, PM10, and PM2.5 can vary significantly with plant operations and maintenance. Therefore, in order to use a calculation method, as proposed by the District, site-specific data and testing is necessary to demonstrate compliance with the proposed emission limits. EPA is available to discuss this in more detail for the District's consideration.

RESPONSE

For a discussion of the cooling tower PM emissions, please see the response to CEC Comment 3 above. The Applicant is requesting additional time to respond to CEC Comment 2 and EPA Comments 1 through 3 regarding the PM emissions from the turbine.

EPA COMMENT

4. Annual Estimates of HAP Emissions and Compliance Demonstration: ***Hazardous air pollutant (HAP) emissions are discussed on pages 94-95 of the PDOC engineering evaluation and presented in Appendix I of the PDOC. To remain below the major source MACT threshold, a single HAP must be less than 10 tpy, and the combined HAPs must be less than 25 tpy. Although the HAP emissions section of the PDOC discusses the conduct of testing for speciated HAPs and total VOC source testing for the CTG, the process primarily contributing to the limit of not more than 10 tpy of a single HAP is the intermittent CO2 vent system, which is part of the CO2 recovery and vent system (S-7616-8-0). Operating scenarios for venting are described in the PDOC, pages 30-31.***

Carbonyl sulfide emissions (COS) are estimated at 9.9 tpy. This estimate is based on imposing operating limits and therefore appears to be a synthetic area source. As a result, the District must require practically and federally enforceable potential-to-emit limits to assure this process is not emitting at the major source level of 10 tpy.

In order to remain below the 10 tpy threshold, the District has proposed permit conditions based on assumptions presented in the calculation methodology provided by the applicant. COS annual emission estimates are based on a maximum CO2 vent stream flow rate of 656,000 lbs/hr; proposed Condition 6 limits the vent stream flow rate. Furthermore, Condition 10 requires a gas flowmeter for the vent system flow rate, and Condition 11 requires recordkeeping of venting events. EPA understands this flow rate is estimated to be the same for both early and mature operating scenarios.

COS annual emission estimates are also based on operations of the CO2 recovery and vent system of not more than 504 hours per year (or an estimated 21 days per year); proposed Condition 7 limits the annual hours on a rolling 12-month period. Unlike the maximum vent stream flowrate, EPA understands that CO2 venting is expected to be less than one-half (e.g., 5-10 days) during mature operations compared to the early operating scenario.

Because the annual tons per year of HAPs is dependent on the hours of venting, including a method for tracking those hours is critical. The flowmeter or another piece of equipment should track the hours of venting. In addition, it is unclear whether the partial hours of venting, e.g., 30-minutes, 45-minutes, are accounted. Therefore, please provide permit conditions and/or require additional monitoring equipment with associated recordkeeping requirements that will assure an accurate accounting of the total hours of operation.

Also, EPA suggests that the District include a condition that includes a lower number of allowable annual hours upon achieving mature operations to provide additional assurance that HAP emissions will not exceed 9.9 tpy. Additionally, as outlined on pages 30-31, allowable CO2 venting events (associated with Condition 11) and associated recordkeeping should be included as permit conditions.

RESPONSE

The Applicant would accept a condition that tracks the partial hours of venting. The Applicant

does not want a change to Condition 7, limiting the annual hours of operation, but would accept a change to Condition 11 to include a condition recording partial hours of operation.

EPA COMMENT

5. Federal Requirements for Internal Combustion Engines: Please include a discussion of the applicability of the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Reciprocating Internal Combustion Engines (40 CFR Part 63, Subpart ZZZZ) and of the Standards of Performance for New Stationary Sources (NSPS) for Compression Ignition Internal Combustion Engines (40 CFR 60, Subpart IIII) as they may apply to the diesel fuel-fired emergency generator sets (S-7616-14-0, S-7616-15-0) and firewater pump engine (S-7616-16-0). Based on the applicability determination, EPA suggests that the District incorporate federally enforceable permit conditions to assure compliance with these requirements, as needed.

RESPONSE

The Applicant would agree to the EPA recommendations for the internal combustion engines.

EPA COMMENT

6. Consistency of PDOC Information with PSD Information: For the purposes of EPA's review of the PDOC evaluation and PDOC, although not required as part of our PSD permit application review and preparation of proposed permit conditions, we are in the process of identifying whether information provided by the Applicant through the PSD permit application process is consistent with the information in the District's evaluation. We would like to ensure that, at a minimum, those data sets and assumptions shared between the PSD and PDOC processes that contribute to the determination of the potential-to-emit, BACT, and assumptions for the air quality analysis/modeling are consistent. At this time, we simply would like to make the District aware that this evaluation is in process. To the extent that we identify inconsistencies during our review, we will address them as part of our PSD permit process.

RESPONSE

The Applicant has no comment.

EPA COMMENT

7. Equivalent Equipment, Internal Combustion Engines and Auxiliary Boiler: The District has included conditions for this equipment (S-7616-13-0, S-7616-14-0, S-7616-15-0, S-7616-16-0) that allows for the use of equivalent equipment upon written District approval. As stated in the proposed permit conditions, approval is granted upon "...determination that the submitted design and performance of the proposed alternate equipment is equivalent to the specifically authorized equipment." EPA suggests that the District also evaluate the air quality modeled impacts of any proposed equivalent equipment.

RESPONSE

The Applicant would agree to SJVAPCD conducting air quality modeling of equivalent equipment if the emissions or stack parameters vary from that provided in the ATC application.

EPA COMMENT

8. Operating Work Practices and Annual Hours of Operations: EPA requests the following conditions be added for the equipment listed below:

- ***Cooling Towers (S-7616-4-0, S-7616-11-0, S-7616-12-0) – For each equipment, please include an operating limit of 8,322 hours per year, along with any necessary recordkeeping requirements.***

- ***Sulfur Recovery System (S-7616-5-0) – Condition 13 required the incinerator firebox temperature to be maintained above 1,200 deg F. Please include a condition that allows compliance demonstration with the temperature.***

- ***Flares (S-7616-3-0, S-7616-6-0, S-7616-7-0) – Condition 10 of the Rectisol AOR emergency flare (S-7616-7-0) allows operations for emergency situations. The PDOC references that the flare will be limited to 200 hours per year of non-emergency operations. Please include a description of the allowable emergency situations, as well as reference to the non-emergency operations.***

- ***Auxiliary Boiler (S-7616-13-0) – For each equipment, please include an operating limit of 2,190 hours per year, along with any necessary recordkeeping requirements. There is reference to flue gas recirculation in Condition 19. Please propose a permit condition that requires the operator to properly operate and maintain the FGR system, which is part of NOx control for the boiler.***

- ***CO2 Recovery and Vent System (S-7616-8-0) – As previously commented under the annual estimates of HAP emissions, allowable CO2 venting events (associated with Condition 11) and associated recordkeeping should be included as permit conditions. Furthermore, specifics about the monitoring requirements for CO, VOC and H2S in Condition 12 should be detailed. Under Condition 8, please clarify the reference for the ppm concentration limits.***

RESPONSE

The Applicant requests that the annual operating limits for the cooling towers be based on emissions, rather than hours of operation, because these may operate all hours of the year, but at partial capacity for a portion of the time.

The Applicant requests that the auxiliary boiler annual operating limits be based on maximum annual fuel consumption rate of 311 billion British Thermal Units (BTUs) per year, with no annual hours of operation limit.

The CO_2 product stream will likely be continuously measured by gas chromatograph for trace constituents. The Applicant intends to use the equipment provided for this purpose to also verify compliance of trace, regulated emissions, as required, during an upset, infrequent CO_2 venting occurrence.

The three flares are designed to handle emergency upset conditions that could happen at the facility. These events are never expected to occur, but the flares must be designed to safely dispose of the maximum gas stream. The gasification flare is designed to handle the maximum syngas production from two gasifiers that could occur due to a downstream failure event (or events). The sulfur recovery unit flare is designed to handle the unlikely case of both Claus trains failing simultaneously. The Rectisol flare is designed to handle total flow from an unlikely equipment failure event, such as a major failure in the acid gas removal (AGR) unit. The duration of these upset events is difficult to predict although HECA will do everything reasonably possible to correct the problem that has caused unplanned flaring in a timely manner and begin actions to minimize emissions and the amount of gas flared.

The Applicant would agree to the remaining EPA recommended conditions.

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
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APPLICATION FOR CERTIFICATION FOR THE *HYDROGEN ENERGY CALIFORNIA PROJECT*

Docket No. 08-AFC-8

PROOF OF SERVICE LIST (Rev. 6/22/10)

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DECLARATION OF SERVICE

I, Dale Shileikis , declare that on September 17 , 2010, I served and filed copies of the attached Applicant Responses to CEC and EPA Comments on the Preliminary Determination of Compliance , dated September 14 , 2010. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: **[www.energy.ca.gov/sitingcases/hydrogen_energy]**.

The documents have been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

FOR SERVICE TO ALL OTHER PARTIES:

X sent electronically to all email addresses on the Proof of Service list;

____ by personal delivery;

X By delivering on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses **NOT** marked "email preferred."

AND

FOR FILING WITH THE ENERGY COMMISSION:

X sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (***preferred method***);

OR

____ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 08-AFC-8
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.