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LOS ESTEROS CRITICAL ENERGY FACILITY, LLC

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August 7, 2019

John Heiser
Compliance Project Manager
Siting, Transmission and
Environmental Protection (STEP Division)
California Energy Commission
1516 Ninth Street, MS-2000
Sacramento, CA 95814
E-Mail: John.Heiser@energy.ca.gov

RE: Los Esteros Critical Energy Facility (03-AFC-02C): Cooling Tower Amendment--Responses to Staff's Data Requests, Set 2, A1 through A4

Dear Mr. Heiser:

On behalf of the Los Esteros Critical Energy Facility ("Project"), Los Esteros Critical Energy Facility, LLC ("Project Owner") submits the following responses to California Energy Commission ("Commission") Staff's Data Requests Set 2, A1 through A4.

If you have any questions regarding these responses, please contact Barbara McBride at 925-570-0849 or Barbara.McBride@calpine.com.

Sincerely,

/S/
Barbara McBride

VISUAL RESOURCES

A1. An updated cooling tower fogging frequency curve for the 90,000 gpm water recirculation rate with maximum gas turbine and maximum gas turbine/duct firing operating loads (two curves on one drawing), with maximum cooling tower visible plume abatement.

RESPONSE: Please see Attachment A.

A2. If the curve shifts towards the portion of the chart indicating an increase in visible plume occurrence, explain the procedures that will be used to ensure that such occurrences are minimized to comply with the Energy Commission Decision (condition VIS-6).

RESPONSE: The Project Owner will continue implementation of existing plume abatement protocols using the updated fogging frequency curve. The Project Owner relies on the fogging frequency curve issued by the cooling tower manufacturer and meteorological information to aid in predicting the likelihood of "fogging" at any time of day for a specific day. The Project operator is notified of the likelihood of fogging for a particular day and time, and the facility's Distributed Control System can be programmed to activate the plume abatement dampers to eliminate fogging.

A3. Please provide the maximum cooling tower heat rejection rates (in MW or MMBtu/hour) for the current 73,000 gpm and for the requested 90,000 gpm cooling tower water recirculation rates, at maximum gas turbine and maximum gas turbine and duct firing operating conditions.

RESPONSE:

	GPM		**73000**	**90000**		**73000**	**90000**	
	Configuration		Duct Fired	Duct Fired	**Increase/**	Non-Duct Fired	Non-Duct Fired	**Increase/**
	Curve Number		N/A	2	**Decrease**	N/A	4	**Decrease**
	Range	(Deg. F)	18.1	15.2	**In Required**	11.1	9	**In Required**
	CTW Duty	(MMBtu/hr)	681.8	682.9	**RH**	406.7	408.4	**RH**
	Relative Humidity		% RH	% RH	Curve	% RH	% RH	Curve
Wet Bulb	30	(Deg. F)		74.3	1.3		93.7	6.1
	35	(Deg. F)		80.2	2.6		94.8	5.3
	40	(Deg. F)	86	85.1	3.1		95.8	4.5
	45	(Deg. F)		89	3.5		96.7	4.1
	50	(Deg. F)		92	3.5		97.3	3.8
	55	(Deg. F)		94	3.4		97.6	3.4
	60	(Deg. F)		95.7	3.4		97.7	3
	65	(Deg. F)		96.7	3.3		97.7	2.7
	70	(Deg. F)		97	2.7		N/A	

A4. Prior to construction, as part of VIS-6, the project owner was required to submit specifications for the abatement system (including the fogging frequency curve) and for the meteorological monitoring and notification system and the operations protocol. Please re-submit this information.

Note: The current VIS-6 condition includes the following language:

"At least 60 days prior to construction of the six-cell cooling tower, the project owner shall provide to the CPM for review and approval the specifications for the abatement system (including the fogging frequency curve) and for the meteorological monitoring and notification system and the operations protocol for its use, that will be used to ensure maximum plume abatement from the dry-cooling section of the six-cell cooling tower."

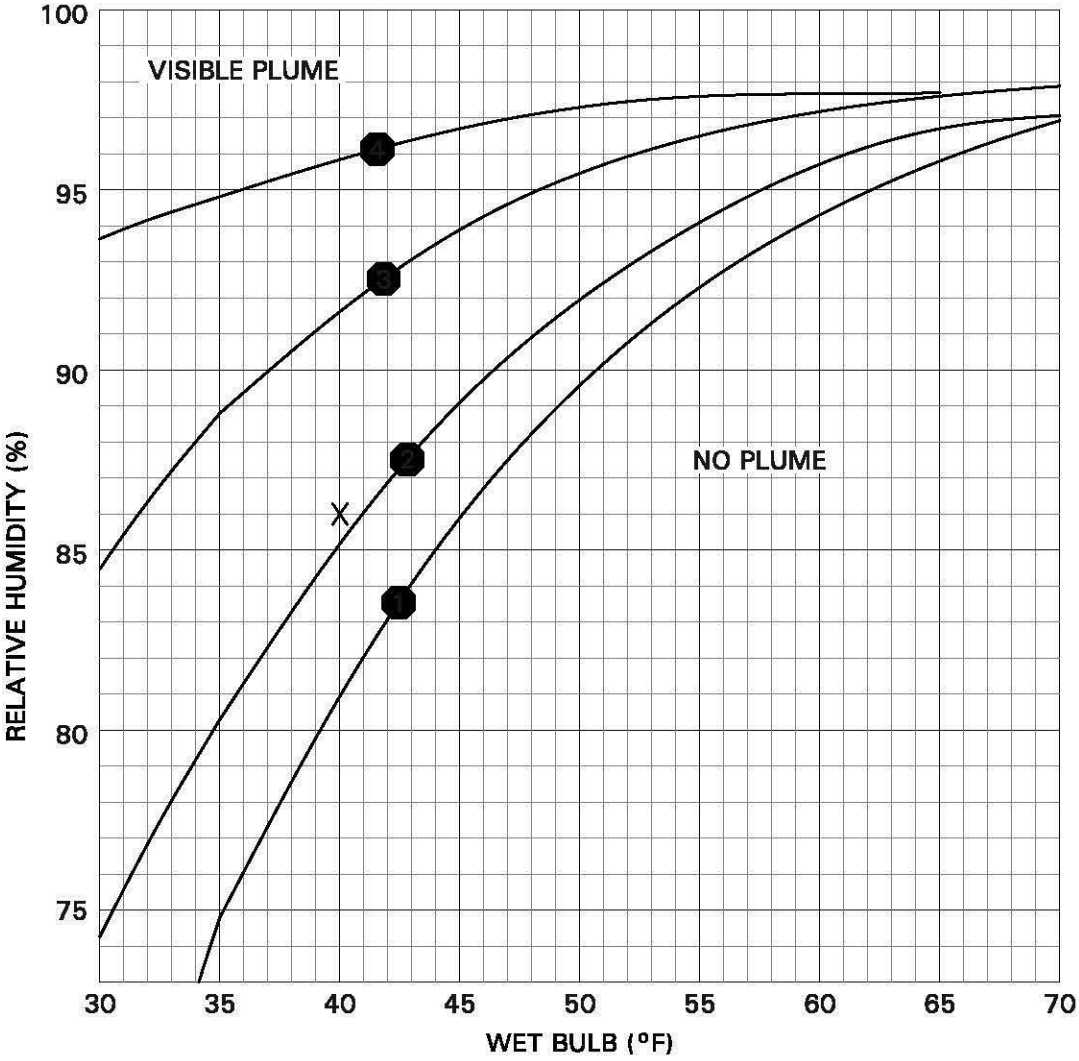
RESPONSE: Please see Attachment B.

Los Esteros Critical Energy Facility (03-AFC-02C): Cooling Tower Amendment -- Responses to Staff's Data Requests, Set 2, A1 through A4

ATTACHMENT A

FOGGING FREQUENCY CURVE

CALPINE - LOS ESTEROS



CIRCULATING WATER FLOW = 90,000 GPM
FOR POINTS 1 THROUGH 4

4 — 9.0°F RANGE, NON-DUCT FIRED OPERATION

3 — 12°F RANGE

2 — 15.2°F RANGE, MAXIMUM DUCT FIRED OPERATION

1 — 17.0°F RANGE

X — DESIGN POINT
18.1°F RANGE, 40°F WBT, 86% R.H., 73,000 GPM

COOLING TOWER DEPOT, Inc.
720-746-1234
www.coolingtowerdepot.com

DRAWING NAME:				
FOGGING FREQUENCY CURVE - CALPINE - LOS ESTEROS				
SCALE:	REVISION: 2	DATE: 07/30/19	DRAWN BY: CAF	APPROVED BY / DATE SDA 07/30/19
FILENAME: FOGGING-CURVE_07-30-09				

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ATTACHMENT B

MECH	1	CONS	x		The project owner shall submit, for CBO design review and approval, the proposed final design, specifications and calculations for each plant major piping and plumbing system listed in Facility Design Table 1, Condition of Certification GEN 2. The submittal shall also include applicable QA/AC procedures.	At least 30 days (or project owner and CBO approved alternative timeframe) prior to the start of any increment of major piping or plumbing construction listed in Facility Design Table 1, Condition of Certification GEN-2, the project owner shall submit to the CBO for design review and approval the final plans, specifications and calculations, including a copy of the signed and stamped statement for the responsible mechanical engineer certifying compliance with the applicable LORS.	Prior to th of any inc of major or plum constru

ELEC	1	CONS	X		Prior to the start of any increment of electrical construction for electrical equipment and systems 480 volts and higher, listed below, with the exception of underground duct work and any physical layout drawings and drawings not related to code compliance and life safety, the project owner shall submit, for CBO design review and approval, the proposed final design, specifications and calculations	At least 30 days (or project owner and CBO approved alternative timeframe) prior to the start of each increment of electrical construction, the project owner shall submit to the CBO for design review and approval of the above listed documents.	Prior to s each incr of elect constru

VIS	6	CONS			The project owner shall reduce the six-cell cooling tower visible vapor plumes through the use of a dry-cooling section that has a stipulated plume abatement design equivalent to or better than that depicted in the Data Request Response No. 53 Attachment VIS-3 Fogging Frequency Curve, dated April 2004.	At least 60 days prior to construction of the six-cell cooling tower, the project owner shall provide to the CPM for review and approval the specifications for the abatement system (including the fogging frequency curve) and for the meteorological monitoring and notification system and the operations protocol for its use, that will be used to ensure maximum plume abatement from the dry-cooling section of the six-cell cooling tower.	Prior construc the six cooling

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Los Esteros Critical Energy Facility Plume Abatement plan

The cooling tower manufacturer has issued a curve to aid in predicting "fogging'. The planned weather station for Los Esteros will provide temperature, humidity and atmospheric pressure inputs to the plant DCS (Distributed Control System). We will also be measuring circulating water temperature. Using these quantities it will be possible to determine the dew point at any time of day for any combination of environmental conditions and to correlate to a point on the cooling tower manufacturer's fogging curve in order to predict the likelihood of fogging. Just prior to this point being reached the DCS will notify the operator of the likelihood of fogging. The DCS can further be programmed to take action by manipulating the plume abatement dampers to eliminate fogging.

3.2.17.7 The water distribution system shall be designed in conjunction with the fill system to maximize heat transfer.

3.2.17.8 Distribution nozzles shall be large enough to prevent clogging (at least as large as smaller of the coil or condenser tube diameter).

3.2.17.9 Distribution header shall be fixed to inhibit axial movement due to hydraulic forces. Seller shall advise the maximum force and moments which can be imposed on each cell's distribution manifold by the Buyer's circulating water piping.

3.2.17.10 Buyer's valving will permit taking one or more cells (up to a maximum of 25 percent) out of service while diverting the flow to the remainder of the operating tower.

3.2.17.11 The complete water distribution system shall be self-draining.

3.2.17.12 The piping used in the water distribution system, including support spacing, thermal expansion, bursting pressure derating, etc., shall be based on a hot water temperature of 125°F as a minimum. The piping shall be pressure type, not gravity type, capable of withstanding an operating pressure at the interface flanges of up to a minimum of 75 psig.

3.2.18 Plume Abatement System

3.2.18.1 The Seller shall provide a plume abatement system which will mitigate visible plumes at the tower for the ambient conditions shown on the Fogging Frequency Curve in Appendix A. The cooling tower shall be designed so that all four of the numbered curves are satisfied. This system shall include water interface at each cell at the same elevation as the water interface for the wet portion alone, water distribution system through vertical headers and returning the water to the wet portion of the tower.

3.2.18.2 Vertical dampers mounted on the exterior of the tower shall prevent air flow through the reheat coils when strictly wet cooling is desired but shall modulate air flow when hybrid operation is required. All dampers for the cooling tower plume abatement system shall operate from motor operators provided by the Seller.

3.2.18.3 Tube materials shall be compatible with the circulating water analysis shown in the Cooling Tower Specification Sheets attached as Appendix A.

3.2.18.4 The Buyer will provide control for the tower dampers as well as the isolation and control of valves at the interfaces to the water risers. The Seller shall provide description of the design and operating parameters required to control the plume visibility.

3.2.18.5 NOT USED.

3.2.18.6 NOT USED .

3.2.19 Collection Basin

3.2.19.1 The Cooling tower basin will have a flat floor and a "waterfall" drop into the pump pit. See Appendix C for nominal basin design.

3.2.19.2 Basin top elevation will be approximately 18 inches above grade. Columns shall extend to the basin floor, approximately 5 feet below the top of the curb. Water level will be controlled between one and two feet below the top of the curb. The basin will extend approximately three feet beyond the tower sides to minimize loss of water due to splashing.

3.2.19.3 Seller shall furnish and install FRP handrails around the basin, attached to the top of the basin curb, to a height of 42 inches above grade.

3.2.20 Access

3.2.20.1 The tower shall be provided with two hot dipped galvanized steel or fire retardant FRP stairways, one located at each end of the tower. Stairways shall extend from fan deck to grade level. All supplied access shall conform to all applicable Laws and Codes and Standards, including OSHA standards and the appropriate Codes and Standards referenced in Part 2.

3.2.20.2 Stairway shall be free standing, connected to but not part of the tower structure, and shall include non-skid treads.

3.2.20.3 Each cell shall have an access door and ladder (manufactured from non-combustible or fire retardant materials and non-slip rungs) from the fan deck for access to and through the drift eliminator plenum chambers to the top of the media at the distribution header and interior isolation valve. A platform will be provided for access to valve. A platform will be provided for step-off to open the hatch in the drift eliminators. The following caution message shall be stenciled in large red letters near the

5.7 Chemical Control

The packaged chemical injection skids shall be incorporated in the DCS. The packaged chemical injection skids shall provide pumps capable of remote speed control and local stroke control. The chemical injection program shall be designed by the chemical supplier based on specific Project requirements.

Start/stop control from the DCS shall be provided with a trip signal when the associated pumps are off.

Sampling and analysis systems are covered in Section 3.10.3.

5.8 Steam Cycle Control Requirements

The HRSG and STG controls shall be designed to protect the STG against spurious trips. During abnormal operating conditions, the objective shall be to keep the HRSGs operating with appropriate drum water levels, the STG synchronized, and the HRSGs and the STG at some partial load until the cause of the transient has been remedied. Transients that shall be considered for automatic runback of the STG include CTG runback and high condenser pressure.

5.9 Cooling Tower Plume Monitoring

Contractor shall provide a cooling tower plume monitoring system to monitor plumes from the new cooling tower. Automated meteorological equipment shall monitor ambient conditions and shall notify the operator when the plume abatement system (furnished with the cooling tower) needs to be activated to ensure that plumes are abated to the maximum extent possible for the stipulated design point. The monitoring system shall also include a video camera and feed to the control room to provide visual verification of plume abatement.

5.10 Instrumentation Design Criteria/General Requirements

5.10.1 General

The instrumentation and control equipment/systems and materials and their installation shall be designed in accordance with all Applicable Laws, Prudent Utility Practices, this Scope of Work, and this Section 5.10. Instruments and valves shall be pre-calibrated, tagged and/or programmed by the supplier. The Owner standard tagging procedure shall be used to identify all instrumentation. All instruments, control valves, switches and process control philosophy shall be shown on the piping and instrument diagrams (P&IDs) in sufficient detail to fully illustrate each instrument loop and its components.

Pneumatic signal levels, where used, shall be 3-15 psig for pneumatic transmitter outputs, controller outputs, electric-to-pneumatic converter outputs, valve positioner inputs, etc.

Instrument tubing shall be supported in both horizontal and vertical runs as necessary. Expansion loops shall be provided in tubing runs subject to high temperatures. The instrument tubing support design shall allow for movement of the main process line.

5.10.8 Field-Mounted Instruments

Field-mounting instruments shall be of a design suitable for the area in which they are located. They shall be mounted in areas accessible for maintenance and relatively free of vibration and shall not block walkways or prevent maintenance of other equipment.

Field-mounted instruments shall be grouped on racks. Supports for individual instruments shall be a prefabricated, off-the-shelf, 2-inch pipe stand. Instrument racks and individual supports shall be mounted to concrete floors, to platforms, or on support steel in locations not subject to excessive vibration.

Individual field instrument sensing lines shall be sloped or pitched in such a manner and be of such length, routing, and configuration that signal response is not adversely affected.

Liquid level controllers shall generally be the non-indicating, displacement type with external cages.

5.10.9 Instrument Air System

Branch headers shall have a shutoff valve at the takeoff from the main header. The branch headers shall be sized for the air usage of the instruments served, but shall be no smaller than 3/8 inch. Each instrument air user shall have a shutoff valve, filter, and regulator (where appropriate) at the instrument.

5.10.10 Site Weather Station Instrumentation Requirements

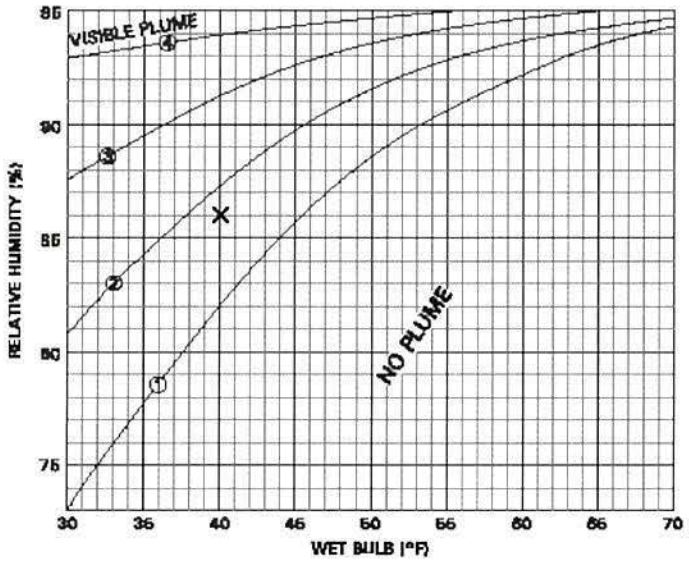
Dry Bulb Temperature: Accuracy $\pm$ 0.10 Deg C over the full range; Range: -50 Deg C to +50 Deg C; Time Constant: <= 3.6 seconds; Linearity: $\pm$ 0.16 Deg C.

Relative Humidity: Accuracy < $\pm$ 1% RH from 10% to 90%; Range: 0 to 100%; Operating Temperature Range: -10 Deg C to + 60 Deg C; Stability: $\pm$ 1% over 12 Months; Response Time 10 seconds.

Barometric Pressure: Accuracy <= 0.1% of full scale; Operating Range: 600 to 1,100hPa; Operating Temperature: -20 Deg C to +80 Deg C; Time Constant: Less than 10 msec.

All Sensors, when new, must have a National Institute of Standards and Technology (NIST) traceable calibration certificate.

FOGGING FREQUENCY CURVE
CALPINE - LOS ESTEROS



④ ——— 10°F RANGE
③ ——— 13.6°F RANGE, NON-DUCT FIRED OPERATION
② ——— 17°F RANGE
① ——— 20.7°F RANGE, MAXIMUM DUCT FIRED OPERATION
X ——— DESIGN POINT
18.1°F RANGE, 40°F WBT, 85% R.H.

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