

September 28, 2009

Mr. Marc Campopiano  
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**Subject: Review of Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plants Draft SED – Selected Sections**

Dear Mr. Campopiano:

As you requested, ENVIRON has conducted a limited review of the State Water Resources Control Board (SWRCB) Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plants Draft Substitute Environmental Document (SED or Policy). ENVIRON reviewed selected sections in the SED including:

- Section 1.0 Introduction;
- Section 2.0 Background;
- Section 3.0 Issues and Alternatives;
- Section 4.0 Environmental Effects and Mitigation;
  - Aesthetics;
  - Air Quality;
  - Greenhouse Gases;
  - Noise;
  - Cumulative and Long-term Impacts; and,
- Referenced sections of the Tetra Tech report.<sup>1</sup>

ENVIRON's review of the SED indicates that there are a number of fundamental issues with the SED. If the analysis and evaluations were revised based on ENVIRON's comments, there appears to be a reasonable likelihood that the SED would have reached different conclusions than currently represented. Most notably, based on our limited review, there may be significant air quality, climate change, noise, and biological resource impacts associated with the Policy that were not identified in the SED. These issues are described in detail below.

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<sup>1</sup> Tetra Tech, 2008. *California's Coastal Power Plants: Alternative Cooling System Analysis*. February.

## ■ AESTHETICS (Section 4.3)

1. The SED has not adequately evaluated the potential aesthetic impacts. The Policy may require the construction of large closed-cycle cooling towers which are both large physical structures and can result in visible plumes (see page 94 of the SED). The SED claims that simple setback requirements will mitigate any potential aesthetic issues without specific evaluation of the actual sites. The SED also indicates that the technologies and design measures can reduce plume visibility. However, it is not clear from the analysis that the technologies or design measures can be implemented nor will they with any certainty reduce plume visibility to less than significant levels. The SED should provide additional documentation, analysis and support for their claims that the stated mitigations will result in less than significant impacts for all potentially applicable facilities. If this is not feasible, then the SED can not conclude that there will not be any significant aesthetic impacts.
2. The SED indicates that the "Tetra Tech report identified building height and setback requirements for all of the facilities where wet cooling towers were considered feasible and developed a conceptual design that complies with local codes."<sup>2</sup> If the SED is relying upon specific mitigation measures in a supporting document, they should be stated clearly in the SED.

## ■ AIR QUALITY (Section 4.5)

3. The SED provides insufficient discussion regarding air quality impacts in regards to the Policy. The SED has not adequately developed an air emissions inventory nor has it evaluated the emissions in comparison to California Environmental Quality Act (CEQA) air quality significance thresholds established by the Districts in which the affected facilities are located. The SED avoids making any conclusion regarding the significance of the air quality impacts. The SED should make a determination based on the available information.
4. The SED does not discuss the California Environmental Quality Act (CEQA) air quality significance thresholds established by the Air Districts. The significance thresholds in the Air Districts where the facilities are located as reported in the SED<sup>3</sup> are summarized in Table 1. Note that significance thresholds exist for multiple criteria air pollutants including sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), volatile organic compounds (VOC), particulate matter less than 10 microns (PM<sub>10</sub>) and particulate matter less than 2.5 microns (PM<sub>2.5</sub>). The SED should discuss these significance thresholds and compare the potential increases in air emissions to these significance thresholds in the relevant Districts. It is standard practice to discuss the CEQA air quality significance thresholds for construction and operational impacts.

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<sup>2</sup> SWRCB, 2009. Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, Draft Substitute Environmental Document. Pg 94. July.

<sup>3</sup> SWRCB, 2009. Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, Draft Substitute Environmental Document. Pg 100. July.

**Table 1. Examples of CEQA Air Quality Significance Thresholds (Operational)**

Air District	Pollutant [lbs/day]					
	SO <sub>x</sub>	NO <sub>x</sub>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
SCAQMD	150	55	550	55	150	55
VCAPCD	NA	25	NA	25	NA	NA
NCUAQMD	219	219	548	NA	88	NA
BAAQMD	NA	54	NA	54	82	54
MBUAPCD	NA	150	550	150	82	NA
SLOCAPCD	10	10	50	10	10	NA
SDAPCD	250	250	550	137	100	NA
SBCAPCD	NA	55	NA	55	80	NA

Notes:

- a. Information obtained from websites for each air district including:
    - i. SCAQMD (<http://www.aqmd.gov/ceqa/handbook/signthres.pdf>)
    - ii. VCAPCD (<http://ci.moorpark.ca.us/EIR/Appendix%20C%20Air%20Quality%20Study.pdf>)
    - iii. NCUAQMD ([http://www.trrp.net/documents/canyon\\_creek/vol2/03\\_12\\_Air\\_Quality.pdf](http://www.trrp.net/documents/canyon_creek/vol2/03_12_Air_Quality.pdf))
    - iv. BAAQMD (<http://www.baagmd.gov/~media/Files/Planning%20and%20Research/CEQA/Workshop%20Draft%20-%20CEQA%20Thresholds%20Options%20Report%204-28-2009.ashx>)
    - v. MBUAPCD & SLOCAPCD ([http://www.mcwra.co.monterey.ca.us/SVWP/DEIR\\_EIS\\_2001/5\\_11.htm](http://www.mcwra.co.monterey.ca.us/SVWP/DEIR_EIS_2001/5_11.htm))
    - vi. SDAPCD (<http://www.sandiego.gov/developmentservices/news/pdf/sdtceqa.pdf>)
    - vii. SBCAPCD (<http://www.countyofsb.org/energy/projects/Wind/LompocFEIR/3.4-Air%20Quality.pdf>)
  - b. Some thresholds are reported in tons per year. These were converted to lbs per day to provide a uniform basis of comparison. The conversion assumed 365 days per year.
5. The SED does not provide adequate documentation in regards to the emission estimates included in Tables 23, 24, and 25 to allow an appropriately experienced and skilled practitioner to reproduce these calculations. The SED should include additional documentation, tables, and/or footnotes that provide an explanation for the bases for the emission estimates including the estimate for the energy penalty.
  6. The SED does not report PM<sub>2.5</sub> emissions due to the energy penalty associated with the installation of cooling towers. The additional power plant emissions are expected to also have PM<sub>2.5</sub> emissions. The SCAQMD indicates that all PM<sub>10</sub> emissions from natural gas

combustion are  $PM_{2.5}$  emissions.<sup>4</sup> If we use this estimate, the  $PM_{2.5}$  emissions are 33 tons, 23 tons, and 25 tons higher than baseline for Scenarios 1, 2, and 3, respectively. The SED should evaluate the  $PM_{2.5}$  emissions increase due to the energy penalty from the installation of closed-cycle wet cooling towers.

7. The SED does not report the increase in air toxic emissions due to the energy penalty associated with the installation of cooling towers. The additional power plant emissions are expected to also have an increase in air toxic emissions. The USEPA indicates that toxic organic and inorganic emissions are expected from the combustion of natural gas, which is a likely means of power generation.<sup>5</sup> The SED should evaluate the health risk due to the increased toxic air emissions.
8. A comparison of the cooling tower  $PM_{10}$  emissions to the CEQA air quality significance thresholds shows that the cooling tower  $PM_{10}$  emissions for the Policy would exceed the CEQA air quality  $PM_{10}$  significance thresholds for a number of facilities (see Tables 2 and 3). Table 2 compares the maximum output reported in the SED while Table 3 compares the 2006 output reported in the SED. The SED should evaluate and discuss this potential impact and revise its significance conclusion appropriately.

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<sup>4</sup> SCAQMD, 2006. Final Methodology to Calculate Particulate Matter  $PM_{2.5}$  and  $PM_{2.5}$  Thresholds. Appendix A, Table A. October.

<sup>5</sup> USEPA, 1998. Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources. Section 1.4. July.

**Table 2. Comparison of Reported Cooling Tower Emissions (Maximum) to CEQA PM<sub>10</sub> Air Quality Significance Thresholds (Operational)**

Facility	USEPA AP-42 Method	Alternative Method	PM <sub>10</sub> Significance Threshold (lbs/day)	Max Output Above Threshold?	
	Max Capacity (lbs/day)	Max Capacity (lbs/day)		[lbs/day]	AP-42 Method
<b>Alamitos</b>	2523	126	150	YES	NO
<b>Contra Costa</b>	946	47	82	YES	NO
<b>Diablo Canyon</b>	5439	272	10	YES	YES
<b>El Segundo</b>	830	42	150	YES	NO
<b>Harbor</b>	178	9	150	YES	NO
<b>Haynes</b>	1878	94	150	YES	NO
<b>Huntington Beach</b>	1059	53	150	YES	NO
<b>Mandalay</b>	528	26	NA	NO	NO
<b>Moss Landing</b>	2554	128	82	YES	YES
<b>Ormond Beach</b>	1431	72	NA	NO	NO
<b>Pittsburg</b>	1012	51	82	YES	NO
<b>SONGS</b>	5016	251	100	YES	YES
<b>Scattergood</b>	1086	54	150	YES	NO

Notes:

- a. Emissions were converted from Table 26 in the SED and assumes 365 days per year.
- b. Significance thresholds correspond to the specific air districts.

**Table 3. Comparison of Reported Cooling Tower Emissions (2006 Output) to CEQA PM<sub>10</sub> Air Quality Significance Thresholds (Operational)**

Facility	USEPA AP-42 Method	Alternative Method	PM <sub>10</sub> Significance Threshold (lbs/day)	2006 Output Above Threshold?	
	2006 Output (lbs/day)	2006 Output (lbs/day)		[lbs/day]	AP-42 Method
Alamitos	249	12	150	YES	NO
Contra Costa	23	1	82	NO	NO
Diablo Canyon	5212	261	10	YES	YES
El Segundo	87	4	150	NO	NO
Harbor	16	1	150	NO	NO
Haynes	406	20	150	YES	NO
Huntington Beach	158	8	150	YES	NO
Mandalay	44	2	NA	NO	NO
Moss Landing	542	27	82	YES	NO
Ormond Beach	52	3	NA	NO	NO
Pittsburg	64	3	82	NO	NO
SONGS	4354	218	100	YES	YES
Scattergood	232	12	150	YES	NO

Notes:

- a. Emissions were converted from Table 26 in the SED and assumes 365 days per year.
  - b. Significance thresholds correspond to the specific air districts.
9. The PM<sub>10</sub> emissions estimated from cooling towers using the alternate method in the SED is based on a theoretical methodology that does not appear to be supported by empirical evidence. It is not clear that the SED's assumptions regarding the alternative method emission estimate are accurate nor that they would be accepted by the various air quality districts. If the SED's calculations are not correct, the PM<sub>10</sub> impacts from cooling towers would exceed additional air district PM<sub>10</sub> air quality significance thresholds.
  10. The Draft SED has not discussed the potential impact of construction emissions that may result due to the Policy. The construction of a cooling tower for a power plant may require meaningful excavation, the use of heavy construction equipment, worker and vendor trips, and may take nearly two years to complete. These emissions sources all contribute to air quality emissions. It is common to include such an evaluation for construction emissions in the air quality section of an environmental impact report.

11. The SED does not report PM<sub>2.5</sub> emissions from cooling towers. ENVIRON estimated the potential PM<sub>2.5</sub> emissions based on the SCAQMD document which indicates the ratio of PM<sub>2.5</sub> to PM<sub>10</sub> emissions from cooling towers as 0.600.<sup>6</sup> If we assume the same proportion of PM<sub>2.5</sub> as reported by the SCAQMD, this would result in PM<sub>2.5</sub> emissions as shown in Tables 4 and 5, which would exceed the CEQA air quality PM<sub>2.5</sub> significance thresholds. The SED should evaluate the PM<sub>2.5</sub> emissions increase due to the installation of closed-cycle wet cooling towers.

**Table 4. Comparison of Reported Cooling Tower Emissions (Maximum) to CEQA PM<sub>2.5</sub> Air Quality Significance Thresholds (Operational)**

Facility	USEPA AP-42 Method	Alternative Method	PM <sub>2.5</sub> Significance Threshold (lbs/day)	Max Output Above Threshold?	
	Max Capacity (lbs/day)	Max Capacity (lbs/day)		[lbs/day]	AP-42 Method
Alamitos	1514	76	55	YES	YES
Contra Costa	567	28	54	YES	NO
Diablo Canyon	3264	163	NA	NO	NO
El Segundo	498	25	55	YES	NO
Harbor	107	5	55	YES	NO
Haynes	1127	56	55	YES	YES
Huntington Beach	636	32	55	YES	NO
Mandalay	317	16	NA	NO	NO
Moss Landing	1532	77	NA	NO	NO
Ormond Beach	859	43	NA	NO	NO
Pittsburg	607	30	54	YES	NO
SONGS	3010	150	NA	NO	NO
Scattergood	652	33	55	YES	NO

Notes:

- a. Emissions were converted from Table 26 in the SED assuming a PM<sub>2.5</sub> to PM<sub>10</sub> ratio of 0.6.<sup>7</sup>

<sup>6</sup> SCAQMD, 2006. Final Methodology to Calculate Particulate Matter PM<sub>2.5</sub> and PM<sub>2.5</sub> Thresholds. Appendix A, Table A. October.

<sup>7</sup> SCAQMD, 2006. Final Methodology to Calculate Particulate Matter PM<sub>2.5</sub> and PM<sub>2.5</sub> Thresholds. Appendix A, Table A. October.

**Table 5. Comparison of Reported Cooling Tower Emissions (2006 Output) to CEQA PM<sub>2.5</sub> Air Quality Significance Thresholds (Operational)**

Facility	USEPA AP-42 Method	Alternative Method	PM <sub>2.5</sub> Significance Threshold (lbs/day)	2006 Output Above Threshold?	
	2006 Output (lbs/day)	2006 Output (lbs/day)		AP-42 Method	Alt Method
			[lbs/day]		
Alamitos	149	7	55	YES	NO
Contra Costa	14	1	54	NO	NO
Diablo Canyon	3127	156	NA	NO	NO
El Segundo	52	3	55	NO	NO
Harbor	10	0	55	NO	NO
Haynes	243	12	55	YES	NO
Huntington Beach	95	5	55	YES	NO
Mandalay	26	1	NA	NO	NO
Moss Landing	325	16	NA	NO	NO
Ormond Beach	31	2	NA	NO	NO
Pittsburg	38	2	54	NO	NO
SONGS	2612	131	NA	NO	NO
Scattergood	139	7	55	YES	NO

Notes:

- a. Emissions were converted from Table 26 in the SED assuming a PM<sub>2.5</sub> to PM<sub>10</sub> ratio of 0.6.<sup>8</sup>

12. The SED may be under-reporting the energy penalty associated with the installation of closed-cycle wet cooling towers. The SED estimates that the energy penalty is approximately 5.5% to 6.3% for the SONGS facility.<sup>9</sup> However, ENERCON estimates that as much as 191 MWe may be lost<sup>10</sup>, which equates to approximately 8.6% assuming a total facility capacity of 2232 MW.<sup>11</sup> The SED should review the ENERCON analysis and consider revising its estimates of the energy penalty. A higher energy penalty would result in even greater air and GHG emissions.

<sup>8</sup> SCAQMD, 2006. Final Methodology to Calculate Particulate Matter PM<sub>2.5</sub> and PM<sub>2.5</sub> Thresholds. Appendix A, Table A. October.

<sup>9</sup> SWRCB, 2009. Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, Draft Substitute Environmental Document. Figure 17, Pg 97. July.

<sup>10</sup> ENERCON, 2009. Feasibility Study for Installation of Cooling Towers at San Onofre Nuclear Generating Station. Pg 43.

<sup>11</sup> SWRCB, 2009. Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, Draft Substitute Environmental Document. Table 10, Pg 49. July.



13. The SED has not quantified air emissions due to the need to build additional power plants as required due to the installation of closed-cycle cooling towers. As stated on page 83 of the SED, the energy penalty that would be incurred at Diablo and SONGS would require the permanent replacement of 220 to 250 MW of capacity. If this replacement was a natural gas power plant, the air emissions may be as much as that estimated in Table 6. Table 6 also compares the potential air emissions to the CEQA air quality significance thresholds in the various air districts where the current coastal plants are located. The air quality emissions from this hypothetical plant would exceed the CEQA air quality significance thresholds. In addition, the construction of this new power plant would contribute even more air emissions. The SED should quantify these air emissions and include them in the discussion in regards to the CEQA air quality significance thresholds.

**Table 6. Estimate of Additional Air Emissions for Replacement Power Plant**

	SO <sub>x</sub>	NO <sub>x</sub>	CO	VOC	PM <sub>10</sub>	PM <sub>2.5</sub>
	[tons/yr]					
<b>220 MW</b>	10	955	245	6	20	20
<b>250 MW</b>	12	1,085	278	7	22	22
	[lbs/day]					
<b>220 MW</b>	56	5,232	1,341	34	108	108
<b>250 MW</b>	63	5,945	1,523	39	123	123
<b>Maximum Threshold (lbs/day)</b>	250	250	550	150	150	55
<b>Emissions Greater than Maximum Significance Threshold?</b>	No	Yes	Yes	No	No	Yes
<b>Minimum Threshold (lbs/day)</b>	10	10	50	10	10	54
<b>Emissions Greater than Maximum Significance Threshold?</b>	Yes	Yes	Yes	Yes	Yes	Yes

Notes:

- Emissions were estimated based on USEPA emission factors for a natural gas stationary turbine.<sup>12</sup>
- NO<sub>x</sub> emission factor is for uncontrolled emissions.
- SO<sub>x</sub> is assumed to be equivalent to SO<sub>2</sub>.
- PM<sub>10</sub> and PM<sub>2.5</sub> is assumed to be equal to total PM per SCAQMD guidelines.<sup>13</sup>

14. The SED does not include any discussion regarding the potential health effects of the various criteria air pollutants. Most notably, it does not discuss the potential impact of increased emissions of particulate matter (PM) less than 10 microns (PM<sub>10</sub>) or less than

<sup>12</sup> USEPA, 2000. Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources. Section 3.1. April.

<sup>13</sup> SCAQMD, 2006. Final Methodology to Calculate Particulate Matter PM<sub>2.5</sub> and PM<sub>2.5</sub> Thresholds. Appendix A, Table A. October.

2.5 microns (PM<sub>2.5</sub>) in diameter from the closed-cycle cooling towers. Exposure to elevated concentrations of particulate matter has been linked to a number of adverse health effects, including acute respiratory infections, lung cancer and chronic respiratory and cardiovascular diseases. Fine particles (PM<sub>2.5</sub>) are considered even more likely than PM<sub>10</sub> to contribute to adverse health effects. This is due in part to the fact that PM penetration into the respiratory tract is dependent on the size of the particles, with the smaller PM<sub>2.5</sub> penetrating deep into the alveolar spaces where they can be retained. Elevated levels of PM<sub>2.5</sub> may exacerbate existing respiratory symptoms and disease (especially in sensitive groups such as children and individuals with cardiopulmonary disease), alter lung tissue and structure, and impair immune system responses. PM<sub>2.5</sub> concentrations above ambient background have also been associated with premature death. The SED should include discussion of these health effects.

## ■ GLOBAL CLIMATE CHANGE (Section 4.6)

15. The SED provides insufficient discussion regarding global climate change impacts in regards to the Policy. The SED has not adequately developed a GHG emissions inventory nor has it evaluated the emissions in comparison to the goals of the State of California to reduce the State's GHG emissions. The SED appears to have prematurely concluded that there is a less than significant impact in terms of global climate change since it has excluded important components of a GHG emissions inventory and the SED has not provided a basis for its conclusions.
16. The SED has not evaluated the climate change impacts due to the Policy in comparison to the California Air Resources Board (CARB) AB 32 Scoping Plan. The California Global Warming Solutions Act of 2006, widely known as AB 32, requires ARB to develop and enforce regulations for the reporting and verification of statewide greenhouse gas emissions. The heart of the bill is the requirement that statewide GHG emissions must be reduced to 1990 levels by 2020. California needs to reduce GHG emissions by approximately 28.5% below business-as-usual predictions (or no action taken) of year 2020 GHG emissions to achieve this goal.<sup>14</sup> The SED indicates that the CO<sub>2</sub> emissions may increase as a result of the Policy (Tables 23, 24, 25). If one assumes that the business-as-usual (i.e., no action taken) scenario is if this Policy was not required, then the baseline emissions reported in the SED can be used to represent the no action taken scenario. The CO<sub>2</sub> emissions reported in the SED results in an increase of up to 1,237,259 tons per year of CO<sub>2</sub> emissions (see Table 6). Note that it is not apparent what the bases for the SED's emission estimates are, therefore ENVIRON has not been able to evaluate the completeness or reliability of the GHG emissions reported in the SED. The Policy would not be consistent with the goals of AB 32 if these are in fact the emissions that would result from the Policy. Based on the emissions reported by the SED, the Policy appears to result in a significant impact with respect to climate change.

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<sup>14</sup> CARB, 2008. Climate Change Scoping Plan. December.

**Table 7. Comparison of Reported GHG Emissions to AB 32 Goals**

	<b>CO<sub>2</sub></b> <b>[tons/year]</b>	<b>Percentage</b> <b>Change from</b> <b>BAU</b>
<b>Business-As-Usual (BAU)</b> <b>or No Action Taken</b> <b>(i.e., Baseline)</b>	9,070,258	
<b>Scenario 1</b>	10,307,517	13.6%
<b>Scenario 2</b>	9,952,096	9.7%
<b>Scenario 3</b>	7,788,926	-14.1%

Notes:

- a. Emissions were taken from Tables 23, 24, and 25 of the SED.
- b. Note that AB 32 requires a 28.5% reduction (indicated by a negative sign) in GHG emissions from a business-as-usual scenario (i.e, a no action taken scenario) for the State's emissions.

17. The SED has not quantified the potential construction emissions due to the Policy. The Office of Planning and Research (OPR) published a Technical advisory entitled *CEQA and Climate Change: Addressing Climate Change Through CEQA* (OPR Advisory).<sup>15</sup> This guidance proposes the mandatory quantification of GHG project emissions, which includes construction emissions. The construction of a closed-cycle wet cooling tower for a power plant will require meaningful excavation, the use of heavy construction equipment, worker and vendor trips, and may take nearly two years to complete. These emissions sources all contribute to GHG emissions. ENERCON provided an approximate schedule to construct the cooling towers at the SONGS facility.<sup>16</sup> Based on this information, ENVIRON has used URBEMIS<sup>17</sup> to estimate the potential GHG emissions associated with the construction of closed-cycle wet cooling towers. ENVIRON estimates that there will be 1,974 metric tonnes of CO<sub>2</sub> emissions for construction of closed-cycle wet cooling towers at the SONGS facility. If this is also required at the 18 other facilities that may be impacted by the Policy, this would be approximately 35,532 metric tonnes of CO<sub>2</sub> emissions due to construction of the cooling towers. The URBEMIS output files are included in the Attachments to this letter. The SED should evaluate the potential GHG emissions associated with construction due to the Policy.

18. The SED has not quantified GHG emissions due to the need to build additional power plants during plant shutdowns required for the installation of closed-cycle cooling towers. As stated on page 83 of the SED, the energy penalty that would be incurred at Diablo

<sup>15</sup> OPR, 2008. *CEQA and Climate Change: Addressing Climate Change Through CEQA* (OPR Advisory). Pg 5. June.

<sup>16</sup> ENERCON, 2009. *Feasibility Study for Installation of Cooling Towers at San Onofre Nuclear Generating Station*. Pg 55-58.

<sup>17</sup> The URBEMIS software was created by SCAQMD, although it is used by other air districts as well. It is used to estimate emissions associated with different types of projects. Although URBEMIS defaults may not represent the exact construction of a cooling tower, it has been used to approximate the potential emissions.

and SONGS would require the permanent replacement of 220 to 250 MW of capacity. If this replacement was a traditional fossil fuel based power plant, the increase in GHG emissions compared to power produced by Diablo or SONGS could be up to 2 million metric tonnes CO<sub>2</sub> per year as shown in Table 8. In addition, the construction of this new power plant would contribute even more GHG emissions. The SED should quantify these GHG emissions and include them in the discussion in regards to the Policy's consistency with AB 32.

**Table 8. Estimate of Additional GHG Emissions for Replacement Power Plant**

Energy Source	Emission Factor [lbs CO <sub>2</sub> per kwh]	Emissions From Generation		Increase from Nuclear	
		220 MW	250 MW	220 MW	250 MW
		[tonnes CO <sub>2</sub> per year]		[tonnes CO <sub>2</sub> per year]	
Coal	2.152	1,855,954	2,109,038	1,824,677	2,073,497
Petroleum	2.419	2,086,223	2,370,708	2,054,946	2,335,166
Gas	1.238	1,067,691	1,213,285	1,036,414	1,177,743
Other Fuels	2.108	1,818,007	2,065,917	1,786,730	2,030,375
Nuclear	0.036	31,276	35,541		

Notes:

- a. Emission estimates are based on emission factors for Pacific Contiguous electric generating plants from the Energy Information Association and World Nuclear Association.<sup>18, 19</sup>

19. The SED has not discussed the potential impacts on coastal areas and estuaries due to global climate change. Global temperature increases may have meaningful negative impacts on ecosystems, natural resources, and human health. Ecosystem structure and biodiversity will be compromised by temperature increases and associated climatic and hydrological disturbances.<sup>20</sup> The availability and quality of potable water resources may be compromised by increased salinization of ground water due to sea-level rises, decreased supply in semi-arid and arid locations, and poorer water quality arising from increased water temperatures and more frequent floods and droughts.<sup>21</sup> These impacts on freshwater systems, in addition to the effects of increased drought and flood frequencies, can reduce crop productivity and food supply. The SED should evaluate this issue and discuss how climate change may impact the coastal areas and estuaries.

20. The SED does not account for GHG emissions associated with water usage. The SED indicates that when closed-cycle cooling towers are installed, municipal water sources

<sup>18</sup> USEPA, 2000. Carbon Dioxide Emissions from Generation of Electric Power in the United States. Table 4, Pg 4. July. [http://www.eia.doe.gov/cneaf/electricity/page/co2\\_report/co2emiss.pdf](http://www.eia.doe.gov/cneaf/electricity/page/co2_report/co2emiss.pdf)

<sup>19</sup> World Nuclear Association. <http://www.world-nuclear.org/education/comparativeco2.html> [Accessed September 24, 2009].

<sup>20</sup> From the IPCC Working Group II Report.

<sup>21</sup> From the IPCC Technical Paper VI: "Climate Change and Water". Available online at: <http://www.ipcc.ch/pdf/technical-papers/climate-change-water-en.pdf>

should be considered for use.<sup>22</sup> The use of water from municipal sources requires electrical energy and results in GHG emissions. The make-up water estimated by Tetra Tech for the SONGS facility is 76,800 gallons per minute.<sup>23</sup> The GHG emissions from potable water distribution can be estimated as 1,272 kilowatt-hours per million gallons (kWh/MG).<sup>24</sup> Assuming a general emission factor for Southern California Edison of 0.631 lbs CO<sub>2</sub> per kilowatt-hour<sup>25</sup>, the CO<sub>2</sub> emissions due to water distribution to the site for the make-up water will be approximately 14,700 metric tonnes of CO<sub>2</sub> emissions per year. The emission factor for recycled water could range from 1,200 to 3,000 kilowatt-hours per million gallons<sup>26</sup>, which would translate to 13,868 to 34,670 metric tonnes of CO<sub>2</sub> per year. Note that the estimated amount of make-up water by Tetra Tech is for salt water, and a fresh water cooling tower may require less make-up water, but absent other information, we have approximated the GHG emissions based on the make-up water for the salt water cooling tower. Additional GHG emissions could also be estimated for water supply and conveyance for fresh water, which could have emission factors as high as 9,727 kWh/MG.<sup>27</sup> The GHG emissions associated with water supply and conveyance to southern California could be as high as 112,412 metric tonnes CO<sub>2</sub> per year for a single facility. The SED should include an evaluation of the GHG emissions associated with non-salt water usage in the cooling towers.

## ■ NOISE (Section 4.7)

21. The SED is deficient in its assessment of the potential significance of noise impacts due to the Policy. The Tetra Tech report<sup>28</sup>, which the SED noise section appears to be based on, appears to incorrectly identify the local noise limits for some of the facilities, uses the incorrect methodology for assessing compliance with the limits, does not characterize the existing sound levels in the vicinity of each facility, and does not characterize potential increases in the ambient noise environment due to the Policy. These evaluations and analyses are expected in environmental impact reports.
  
22. The SED does not discuss the significance thresholds for noise impacts that are typically included. The SED indicates that “the Tetra Tech report identified four facilities (Haynes, Alamitos, Scattergood, and Morro Bay) that would have to incorporate such measures [control noise] in order to comply with local noise ordinances.”<sup>29</sup> However, CEQA

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<sup>22</sup> SWRCB, 2009. Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, Draft Substitute Environmental Document. Pg 69. July.

<sup>23</sup> Tetra Tech, 2008. *California's Coastal Power Plants: Alternative Cooling System Analysis*. Pg N-18. February.

<sup>24</sup> Navigant Consulting, 2006. Refined Estimates of Water-Related Energy Use in California. Table ES-1, pg 2. December. [http://www.energy.ca.gov/pier/project\\_reports/CEC-500-2006-118.html](http://www.energy.ca.gov/pier/project_reports/CEC-500-2006-118.html)

<sup>25</sup> California Climate Action Registry Database: Southern California Edison Company 2007 PUP Report. 2008. Available at: <https://www.climateregistry.org/CARROT/public/Reports.aspx>

<sup>26</sup> Navigant Consulting, 2006. Refined Estimates of Water-Related Energy Use in California. Table 8, pg 24. December. [http://www.energy.ca.gov/pier/project\\_reports/CEC-500-2006-118.html](http://www.energy.ca.gov/pier/project_reports/CEC-500-2006-118.html)

<sup>27</sup> Navigant Consulting, 2006. Refined Estimates of Water-Related Energy Use in California. Table ES-1, pg 2. December. [http://www.energy.ca.gov/pier/project\\_reports/CEC-500-2006-118.html](http://www.energy.ca.gov/pier/project_reports/CEC-500-2006-118.html)

<sup>28</sup> Tetra Tech, 2008. *California's Coastal Power Plants: Alternative Cooling System Analysis*. February.

<sup>29</sup> SWRCB, 2009. Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, Draft Substitute Environmental Document. Pg 102. July.

guidelines indicate that assessment of noise impacts should include an evaluation of 1) compliance with local noise regulations, 2) impacts from temporary increases in ambient noise (e.g., due to construction), 3) impacts from permanent increases in ambient noise (e.g., due to operation), and 4) compatibility of overall sound levels with the action at nearby land uses. The SED has not adequately completed these evaluations to support final conclusions regarding the potential noise impacts due to the Policy.

23. The SED may be under-reporting the number of facilities that may require mitigation measures for noise impacts. The Tetra Tech report referenced by the SED incorrectly identifies the applicable noise limits (or incorrectly stated that there are no specific noise limits) for facilities in the jurisdictions of the City of Los Angeles, Huntington Beach, Oxnard, Morro Bay, San Diego County, and El Segundo.<sup>30</sup> In addition, the Tetra Tech report appears to incorrectly compare only the projected wet cooling tower noise with the applicable local noise limits instead of comparing the *overall* noise levels of each facility with the established limits. Because of these errors, the SED appears to incorrectly characterize several facilities where it is probable that compliance with the applicable local noise limits would either be difficult or not feasible if closed-cycle wet cooling towers are installed. These facilities include Alamitos Generating Station, Haynes Generating Station, Huntington Beach Generating Station, San Onofre Nuclear Generating Station, and Scattergood Generating Station. For example, the Tetra Tech report identifies a noise limit of 70 dBA for the Huntington Beach Generating Station because it is located in an area designated for General Industrial use, designated Noise Zone 4 in the Huntington Beach Municipal Code (8.40.040). However, the report fails to report the noise limit of 55 dBA between 7 a.m. and 10 p.m. and 50 dBA between 10 p.m. and 7 a.m. which are applicable for the nearby residential properties (Noise Zone I) located approximately 300 feet from the nearest cooling tower. As identified in the Tetra Tech report, a noise limitation of 60 dBA measured at 800 feet was specified for the design of these wet cooling towers, which would result in a sound level of 69 dBA at the nearest residences. This level would be approximately 19 dBA over the allowable nighttime limit and does not include noise from other existing equipment at the facility, which would also need to be included in a noise assessment. The SED should re-evaluate its noise analysis to ensure that it has accurately represented the potential mitigation measures required and the potential significant impacts due to the Policy.
24. The Tetra Tech report specifies that cooling tower noise levels for some facilities that would result in sound levels that exceed acceptable levels considered at nearby residential and recreational uses.<sup>31</sup> For example, Tetra Tech selected a design specification for the cooling tower sound level of 60 dBA at 800 feet for the Huntington Beach Generating Station. However, there are residences approximately 300 feet from the towers where the resulting cooling tower noise level would be approximately 69 dBA, 24-hours a day, resulting in a Community Noise Equivalent Level (CNEL) of 76 dBA.<sup>32</sup>

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<sup>30</sup> Tetra Tech, 2008. *California's Coastal Power Plants: Alternative Cooling System Analysis*. Chapter 7. February.

<sup>31</sup> Tetra Tech, 2008. *California's Coastal Power Plants: Alternative Cooling System Analysis*. Chapter 7. February.

<sup>32</sup> A CNEL is a weighted average of sound levels gathered throughout a 24-hour period with 5 dBA added to the hourly levels occurring between 7 and 10 p.m. and 10 dBA added to levels occurring between 10 p.m. and 7 a.m. The

For residential areas, a CNEL greater than 75 dBA would be considered a significant noise impact to these residences. Other facilities where similarly unacceptable noise levels could occur include the Contra Costa Power Plant, Huntington Beach Generating Station, Mandalay Generating Station, and Scattergood Generating Station. The SED should include discussion of these evaluations and revise the significance conclusion to be consistent with this information.

25. The SED and Tetra Tech report do not identify or characterize the existing ambient noise levels in the vicinities of the facilities. A fundamental approach to evaluate if there is a significant noise impact is to evaluate if there is a substantial change in noise environment due to the Policy. Without this information, it is not possible to evaluate the potential significance of noise impacts. The SED should evaluate the noise impact using this approach and/or discuss how such an evaluation will be incorporated to ensure that the Policy will not lead to significant noise impacts.

## ■ **BIOLOGICAL RESOURCES (Not included in SED)**

26. As described above in the Internal Consistency Section of ENVIRON's review, biological resources were omitted from further environmental analysis in Section 4.0, which is not appropriate based on the sensitive plant and animal resources described for each major planning region in Section 2.1 on the Environmental Setting and the SED analysis provided in Sections 2.2 and 3.0 of the SED. The result is that the full range of impacts suitable for discussion of a program-level SED are not identified and analyzed.
27. The SED inappropriately limits the definition of the area of potential adverse effects suitable for a program-level analysis. Discussion of potential adverse effects focuses on aquatic organism impingement and entrainment at water intake points, but the facility-specific data for Diablo Canyon presented on page 30 of Section 2.3 of the SED identifies a much larger area of impact extending 74 kilometers (km) along the shore and 3 km out into the ocean. If the Diablo Canyon example is identified as the area of impact, then all biological resources with the potential to be identified in that area should be analyzed and not just limited to aquatic organism effects at water intake points or cooling water release points. Likewise, if other facilities have site-specific data identifying the area of impact, those data should be used here and in subsequent project-level analysis, if required, to examine potential adverse effects on biological resources.
28. The SED does not analyze the full range of potential adverse impacts on biological resources appropriate for a program-level approach for the alternatives analyzed and recommended by staff in Section 3.0. For example, Section 3.3 concludes with the staff recommendation to adopt Alternative 3, which includes measures to limit once-through-cooling (OTC) impacts but acknowledges that the nuclear power plant requires special consideration. Thus, the staff recommendation is that nuclear power plants should

conduct third-party feasibility studies to examine the technology options and potentially delay implementation, but this recommendation appears to defer identification of a reasonable range of impacts to a later and unspecified time and does not bracket or describe the broad range of reasonable impacts. Therefore, it is unclear what the potential delay to implementation may be and the magnitude of subsequent OTC impacts that may occur in the meantime. Another example where the full range of potential adverse effects appears to not be complete is in Section 3.5 where the SED discusses whether the policy should include desalinization plants. The SED concludes by recommending that desalinization plants should be covered by a different policy, but if this recommendation is not adopted, then the full range of possible impacts if desalinization plants are included in the Policy is not appropriately identified or analyzed. It is unclear whether an alternative other than what the SED recommends would be adopted at this time.

29. The SED omits entire taxa (e.g., plant communities and birds) in the potential adverse biological effects described in Sections 2.2 and 3.0 of the SED. For example, Section 2.1 identifies numerous sensitive plant communities and habitats in the eight respective planning regions that could be affected including tidal and brackish marshes, and kelp beds. However, potential adverse effects on sensitive plants and habitats are not identified or analyzed anywhere in the SED. Section 2.1 describes the importance of sea rocks and islands that may occur within the potential impact areas as important resources for nesting seabirds, but potential impacts on birds are not identified or analyzed. In addition, Section 2.1 indicates that the Humboldt Bay facility located in the North Coast planning region (Region 1) is only two miles from the Humboldt Bay National Wildlife Refuge (NWR), which provides valuable breeding and stopover habitat for migratory waterbirds. The Humboldt Bay NWR is particularly valuable because it is the most important breeding habitat for black brant (*Branta bernicula nigricans*) in the U.S. south of Alaska.<sup>33</sup> In summary, the biological resources analysis described in Sections 2.2 and 3.0 is incomplete and provides no justification for omission of entire taxa. Section 2.3.2 on Threatened, Endangered, and Protected Species should cover all taxa with the potential to be affected and potential impacts should be reflected in the completion of the CEQA checklist under Item 4a where direct impacts or habitat modifications affecting candidate, sensitive, or special-status species are described. Any changes should be carried through to Item 18a under the Cumulative Impacts section of the CEQA checklist where impacts to fish and wildlife populations and their habitats are described.
30. The SED appears to have substantial data gaps that may prevent adequate definition of baseline effects for environmental review. For example, Section 2.3 describes available studies for impingement and entrainment analysis and concludes that data on invertebrates and shellfish are scarce and not always comparable across facilities for compliance tracking. Further recommendations include implementation of a standardized monitoring and reporting method to address this data gap. In Section 3.8,

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<sup>33</sup> U.S. Fish and Wildlife Service. 2009. Humboldt Bay National Wildlife Refuge Overview. Accessed at: <http://www.fws.gov/humboldt/bay/> on September 24, 2009.



the SED analyzes options for baseline monitoring and recommends adopting Alternative 3, which involves compliance monitoring for Track 2 facilities only. However, it is unclear whether the proposed compliance monitoring would address concerns described in Section 2.3 regarding the need for a consistent monitoring and tracking report system. Additional detail should be provided to clarify the intent of the SWRCB to include standardized monitoring and reporting in the policy. If the intent of the SED is to capture program-level analysis and this policy is implemented at the state level, it would seem inappropriate to defer specification of the standardized monitoring and reporting scheme to a later or project-level analysis.

31. The SED has not adequately evaluated the potential impacts on land due to the Policy. In the Tetra Tech report referenced by the SED, it states that “under the Coastal Act, this area is considered an Environmentally Sensitive Habitat (ESHA) and is subject to limits on development that encroaches upon it. The CCC has noted that the coastal development permit (CDP) issued to SCE [Southern California Edison] for the SONGS [San Onofre Nuclear Generating Station] does not allow for significant clearing of vegetation and would require, at a minimum, an amendment to allow constructing wet cooling towers in this area.”<sup>34</sup> The potential for impacts to biological resources on land is possible and the SED should include evaluation and discussion of this issue.

## ■ UTILITIES AND SERVICE SYSTEMS (Section 4.10)

ENVIRON has only reviewed Section 4.10 of the SED in terms of consistency with the referenced Jones and Stokes report. ENVIRON has not evaluated the technical accuracy of the modeling and evaluation performed by Jones and Stokes.

32. The SED does not appear to adequately discuss the required mitigation to ensure utility service and grid reliability. The Jones and Stokes report referenced by the SED indicates that “the key will be ensuring the transmission system is capable of delivering power from those plants to the loads presently served by OTC plants.”<sup>35</sup> However, there is no specific discussion in the mitigation measures part of section 4.10 regarding how the transmission system will be maintained or upgraded in conjunction with the enforcement of the Policy. Given the discussion in the Jones and Stokes report, it seems that the SED should discuss this issue and address how the Policy will allow for potential postponement or selection of compliance means so that the utility service will not be disrupted. Without discussion of the mitigation measures, it is not clear that there would not be potentially significant impacts to the electrical transmission grid.
33. The SED does not appear to adequately discuss the required mitigation to ensure utility service and grid reliability. The Jones and Stokes report referenced by the SED indicates that “the analyses conducted for this study shows that while the Board’s pending OTC policy does have potential to negatively affect electric reliability, proper

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<sup>34</sup> Tetra Tech, 2008. California’s Coast Power Plants: Alternative Cooling System Analysis. Pg. N-11. February.

<sup>35</sup> ICF Jones & Stokes, 2008. Electric Grid Reliability Impacts from Regulation of Once-Through Cooling in California. Pg 3. April.

planning can compensate for any plant retirements and prevent reliability problems, provided the industry has sufficient time to respond.”<sup>36</sup> Given the discussion in the Jones and Stokes report, it seems that the SED should discuss this issue and address how the Policy will allow for potential postponement of cooling tower retrofitting or for the selection of other compliance means so that utility service will not be disrupted. Without such discussion of mitigation measures to provide proper planning, it is not clear that there would not be potentially significant impacts to the electrical transmission grid.

34. The SED does not appear to adequately discuss the required mitigation to ensure utility service and grid reliability. The Jones and Stokes report referenced by the SED indicates that “the key recommendation arising from this study is that the industry must continue comprehensive study of the issue, examining the reliability implications of retirement of each plant individually and in combinations with all other plants, and constantly reassess the reliability implications of the Board’s new policy as it is planned and enacted.”<sup>37</sup> Given the discussion in the Jones and Stokes report, it seems that the SED should discuss this issue and address how the Policy will allow for potential postponement of cooling tower retrofitting or for the selection of other compliance means so that utility service will not be disrupted. Without such discussion to provide ongoing assessment, it is not clear that there would not be potentially significant impacts to the electrical transmission grid.

## ■ CUMULATIVE AND LONG-TERM IMPACTS (Section 4.12)

35. The SED does not adequately discuss the potential for cumulative and long-term impacts. The information included in Section 4.12 on page 108 of the SED is only a description of the CEQA guidelines. The assessment is a single sentence and does not discuss any of the environmental impacts. The potential cumulative impact of the Policy may lead to significant adverse impacts. As discussed above, the installation of closed-cycle wet cooling towers may lead to significant air and GHG emissions, and noise and biological resource impacts. The SED does not appear to provide adequate discussion to support its finding that the Policy will not result in cumulative impacts.

## ■ INTERNAL INCONSISTENCIES

36. Overall, the SED suffers from a number of internal inconsistencies; correction of these inconsistencies may result in a different outcome. The primary source of inconsistency is that those topic areas identified as having potentially adverse environmental effects on page 93 of Section 4.2 (Potential Adverse Environmental Effects) do not match the results of the completed California Environmental Quality Act (CEQA) Checklist in Appendix B and the subset of topic areas further analyzed in Section 4.0. The CEQA Checklist is typically used by lead agencies to focus environmental analysis on those

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<sup>36</sup> ICF Jones & Stokes, 2008. Electric Grid Reliability Impacts from Regulation of Once-Through Cooling in California. Pg 4. April.

<sup>37</sup> ICF Jones & Stokes, 2008. Electric Grid Reliability Impacts from Regulation of Once-Through Cooling in California. Pg 6. April.

areas where the potential for adverse effects may occur according to four outcomes: 1) no impact; 2) less than significant; 3) less than significant with mitigation incorporated; and 4) potentially significant. Therefore, any topic area that was determined to have no impact based on the completion of the CEQA checklist is typically identified as such and not included in further environmental analysis in the SED. An internally consistent document should have congruence between those topic areas identified as having no impact in the list on page 93 of Section 4.2, the completion of that topic area in the CEQA checklist in Appendix B, and the inclusion of further environmental analysis in Section 4.0. For example, Biological Resources are not listed on the topic areas excluded from further analysis in Section 4.0 in the list provided on page 93 of Section 4.2, but there is no subsequent analysis of potential effects under this topic area in Section 4.0. Adverse biological resource effects are the focus of many of the alternatives analyzed by staff in Section 3 on Issues and Alternatives, so the exclusion of a biological resources discussion in Section 4 is a critical deficiency. Furthermore, the completed CEQA checklist describes biological resources as having no impact, which is not supported by the detailed analysis and discussion in Section 2.2 on Biological and Cumulative Impacts From Once Through Cooling and staff analysis in Section 3.0.

## ■ ALTERNATIVES (SECTION 3)

37. The SED does not analyze the Policy alternatives compared to what is done in standard practice for CEQA evaluations. The CEQA guidelines<sup>38</sup> provide direction for the discussion of alternatives which includes:

- A description of "...a range of reasonable alternatives to the project, or to the location of a project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives."
- A setting forth of alternatives that "...shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project. The range of feasible alternatives shall be selected and discussed in a manner to foster meaningful public participation and informed decision making."
- A discussion of the "No Project" alternative, and "...If the environmentally superior alternative is the "no project" alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives."

The SED describes what they term alternatives in Section 3.0, but it does not appear that the SED has evaluated the environmental impacts of each alternative. It is unclear based on the information provided in the SED how the alternatives compare to the

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<sup>38</sup> 14 CCR § 15126.6

Policy, most notably, if the alternatives may provide an environmentally superior option to the Policy. The SED should evaluate the alternatives in terms of environmental impacts relative to the Policy.

38. In Section 3.2, the SED discusses how new and existing plants should be defined but has not evaluated the potential environmental impacts associated with what definition is chosen. It seems that the alternatives for this issue could have meaningful environmental impacts since the definition may impact what facilities are required to comply with the Policy, how the facilities comply, and when the facilities comply. In an alternatives section, the SED should evaluate the environmental impacts associated with the differences in definition for new and existing facilities.
39. In Section 3.3, the SED discusses how the Policy may distinguish between nuclear and fossil-fueled facilities but has not evaluated the potential environmental impacts associated with the alternatives. The construction and operation of retrofits at nuclear facilities may lead to significant environmental impacts, such as increased air emissions due to construction, due to the energy penalty associated with closed-cycle wet cooling towers, and due to the operation of closed-cycle wet cooling towers. The SED does not discuss in much detail the potential environmental benefits if the nuclear facilities were exempted from the Policy, which might include less air emissions, less GHG emissions, less biological impacts, and less noise impacts than the Policy. The SED appears to defer the necessary environmental analysis that may demonstrate the benefit of excluding nuclear facilities in alternative 3. It seems that these environmental analyses may be more appropriately included in the SED.
40. In Section 3.4, the SED discusses how the Policy may establish separate requirements for existing low capacity units, but has not evaluated the potential environmental impacts associated with these alternatives. The construction and operation of close-cycle wet cooling towers may have environmental impacts that outweigh the potential environmental benefits of installing them. The SED should evaluate the potential environmental impacts of establishing alternative requirements for low capacity units so that the overall impacts and benefit can be compared to the Policy.
41. The SED does not appear to discuss and or compare the environmental impacts for the two tracks that are an option in the Policy. The Policy includes two tracks to compliance for existing facilities to reduce environmental impacts; Track 1 is the retrofitting and use of wet-cooled towers and Track 2 is the other methods (e.g., physical barriers, behavioral barriers, and operational modifications).<sup>39</sup> The differences in the Tracks do not appear to be thoroughly and completely explored particularly in the context of disproportionate costs relative to potential environmental gains. Its not clear if Track 2 technologies could achieve the same reductions in impingement and entrainment as Track 1. The SED should evaluate and compare environmental impacts from the Track 1 and Track 2 approaches including the potential benefits in terms of impingement and entrainment.

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<sup>39</sup> SWRCB, 2009. Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, Draft Substitute Environmental Document. Appendix A, pg A-3. July.

## ■ REASONABLY FORESEEABLE MEANS OF COMPLIANCE (Section 4.1)

42. The SED reports that modifications to intake screens is an option that may be made to limit impingement and entrainment and/or enable the release of organisms before mortality or significant injury occurs.<sup>40</sup> However, there does not appear to be any meaningful discussion to ascertain whether such modifications could meet the Policy's goals of reducing impingement and entrainment. Most notably, there is no comparison of how such means of compliance would compare to the retrofitting with closed-cycle wet cooling towers. The SED should quantitatively evaluate the environmental impacts of these alternative means of compliance (e.g., barrier nets, aquatic filtration barriers, intake relocation, velocity caps, variable frequency drives, and seasonal operation) and compare them to the proposed reductions in impacts anticipated from retrofitting existing facilities with a closed-cycle wet cooling tower.
43. The SED does not appear to account for the potential impact on existing power plant infrastructure from the increase in corrosiveness due to the use of salt water in a closed-cycle wet cooling tower. Based on a design of 1.5 cycles of concentration, there will be a 50 percent increase in chloride concentration. Additionally, the use of closed-circuit cooling will result in elevated cooling water temperatures as compared to the existing once-through cooling systems at these facilities. Chloride is highly corrosive, and at a chloride concentration about 1.9 percent, the handling of seawater requires the use of corrosion resistant materials, such as titanium, specialty alloys, or non-metallics. At a facility that is currently operating using once through cooling water, the existing condenser tubes are likely made from a corrosion resistant alloy, however, these alloys may not be applicable for higher chloride concentrations or increased temperatures, as chloride becomes more corrosive with increasing temperature.<sup>41</sup> The use of closed-loop seawater cooling could require upgrades to the existing condensers such as new tubes. Regarding the potential optimization of the condensers to improve efficiency, the Tetra Tech report concludes that work on the condensers could require significant downtime and therefore an alternative was recommended. It is not clear if the SED has accounted for the potential impact on existing power plant infrastructure. The SED should account for the potential requirements to retrofit other parts of the power generating facilities in all analyses.
44. The SED also does not appear to account for the potential increase in fouling of the condensers due to the use of salt water in closed-cycle wet cooling towers. A major issue with closed-loop seawater cooling is the increased potential for fouling. An increase in the rate of fouling in a condenser could result in off-cycle or unplanned shutdowns of a power generating unit which could lead to meaningful environmental impacts due to the need for alternative power generation during shutdowns. If the design of current power generating condenser systems is not sufficient to handle the salt

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<sup>40</sup> SWRCB, 2009. Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, Draft Substitute Environmental Document. Pg 28. July.

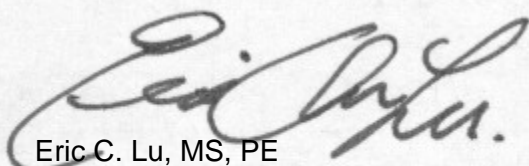
<sup>41</sup> Truman, J.E., 1977. Influence of Chloride Content, pH and Temperature of Test Solution on the Occurrence of Stress Corrosion Cracking (SCC) With Austenitic Stainless Steel. Corrosion Science. Vol. 17, no. 9, pp. 737-746.

water closed-cycle wet cooling towers, then there could be increased condenser fouling or additional requirements for condenser re-design. The SED should include this issue in its evaluations of potential means for compliance, and the subsequent environmental impacts.

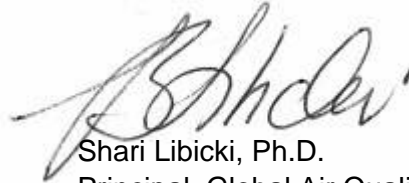
45. The SED does not discuss the various environmental impacts of fresh water wet cooling towers in comparison to salt water wet cooling towers. The Policy should evaluate this as an alternative given the meaningful consequences of using salt water in terms of design considerations. It is not clear how the environmental impacts of using fresh water cooling towers compares to salt water cooling towers.

Please feel free to contact Eric Lu at (415) 796-1934 or Shari Libicki at (415) 796-1933 if you have any questions about this review.

Sincerely,



Eric C. Lu, MS, PE  
Senior Manager



Shari Libicki, Ph.D.  
Principal, Global Air Quality Practice Leader

cc: Kelly O'Donnell  
Southern California Edison

Attachments

## **ATTACHMENTS**

Detail Report for Annual Construction Unmitigated Emissions (Tons/Year)

File Name: U:\Southern California Edison\SWRCB EIR\Construction Emissions\SONGS Phase 1.urb924

Project Name: SONGS V2

Project Location: Orange County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

	<u>CO2</u>
2010	264.10
Mass Grading 01/01/2010-04/30/2010	101.99
Mass Grading Dust	0.00
Mass Grading Off Road Diesel	96.63
Mass Grading On Road Diesel	0.00
Mass Grading Worker Trips	5.35
Building 05/01/2010-07/31/2010	162.11
Building Off Road Diesel	52.69
Building Vendor Trips	68.32
Building Worker Trips	41.11

Phase Assumptions

Phase: Mass Grading 1/1/2010 - 4/30/2010 - Default Mass Site Grading/Excavation Description

Total Acres Disturbed: 14

Maximum Daily Acreage Disturbed: 3.5

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day



**9/28/2009 2:03:55 PM**

- 1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day
- 1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day
- 1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Building Construction 5/1/2010 - 7/31/2010 - Default Building Construction Description

Off-Road Equipment:

- 1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day
- 2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day
- 1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day
- 1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day
- 3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Detail Report for Annual Construction Unmitigated Emissions (Tons/Year)

File Name: U:\Southern California Edison\SWRCB EIR\Construction Emissions\SONGS Phase 2.urb924

Project Name: SONGS V3

Project Location: Orange County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

	<u>CO2</u>
2010	459.52
Building 08/01/2010-12/31/2011	459.52
Building Off Road Diesel	89.17
Building Vendor Trips	231.22
Building Worker Trips	139.13
2011	1,086.04
Building 08/01/2010-12/31/2011	1,086.04
Building Off Road Diesel	210.76
Building Vendor Trips	546.51
Building Worker Trips	328.78
2012	3.59
Coating 04/01/2012-04/30/2012	3.59
Architectural Coating	0.00
Coating Worker Trips	3.59

Phase Assumptions

Phase: Building Construction 8/1/2010 - 12/31/2011 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day

**9/28/2009 2:04:34 PM**

- 2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day
- 1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day
- 1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day
- 3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 4/1/2012 - 4/30/2012 - Type Your Description Here

Rule: Residential Interior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 100

Rule: Residential Interior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 50

Rule: Residential Exterior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 100

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Detail Report for Annual Construction Unmitigated Emissions (Tons/Year)

File Name: U:\Southern California Edison\SWRCB EIR\Construction Emissions\SONGS Phase 3.urb924

Project Name: SONGS V4

Project Location: Orange County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

CO2

2012	162.09
Building 01/01/2012-03/31/2012	162.09
Building Off Road Diesel	52.69
Building Vendor Trips	68.31
Building Worker Trips	41.09

Phase Assumptions

Phase: Building Construction 1/1/2012 - 3/31/2012 - Default Building Construction Description

Off-Road Equipment:

- 1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day
- 2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day
- 1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day
- 1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day
- 3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day