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March 27, 2013

VIA HAND DELIVERY

Ms. Felicia Miller, Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Re: Huntington Beach Energy Project (12-AFC-03)
Air Quality Correspondence dated March 25, 2013

Dear Ms. Miller:

On behalf of Applicant AES Southland Development, LLC, enclosed herein for docketing in the above-referenced proceeding please find correspondence submitted to the South Coast Air Quality Management District ("District") on March 25, 2013. Such correspondence was submitted to the District in response to requests for further information needed to complete the District's evaluation of the Huntington Beach Energy Project. In addition to the enclosed correspondence, Applicant provides five (5) disks containing the correspondence and the related HARP modeling files and historic emission estimates. Should you require additional disks containing this data, please do not hesitate to let me know.

Very truly yours,

Melissa A. Foster

MAF:jmw
Enclosures

[redacted]

From: Stephen O'Kane
Sent: Monday, March 25, 2013 12:54 PM
To: Andrew Lee; Chris Perri
Cc: Mohsen Nazemi; Ann Millican; Brian Yeh; John Yee; Vicky Lee; felicia.miller@energy.ca.gov; Jerry.Salamy@CH2M.com
Subject: RE: Request for Additional Clarifying Information for Huntington Beach Energy Project

Andrew and Chris,

Attached is AES Huntington Beach's response to your letter requesting additional information for the Huntington Beach Energy Project. A hard copy of this letter along with two CD's of containing modeling files and historic emissions from AES facilities and a check in the amount of $5,229.18 for application fees for an oil/water separator have been sent by courier to your agency, care of Mr. Brian Yeh. We hope the attached information meets all of the District's needs and look forward to reviewing your Preliminary Determination of Compliance for our application.

Please don't hesitate to call with any questions.

Sincerely,

Stephen O'Kane
AES Huntington Beach

From: Andrew Lee [mailto:ALee@aqmd.gov]
Sent: Tuesday, February 19, 2013 9:34 AM
To: Stephen O'Kane
Cc: Mohsen Nazemi; Ann Millican; Brian Yeh; John Yee; Chris Perri; Vicky Lee; felicia.miller@energy.ca.gov
Subject: Request for Additional Clarifying Information for Huntington Beach Energy Project

Good morning Stephen,
Please find attached a letter requesting additional clarifying information primarily concerning greenhouse gas analysis and clarifying information on the operation of your proposed equipment on the Huntington Beach Energy Project (HBEP). This information is being requested primarily due to the authority bestowed upon the SCAQMD through approval of the SIP for our Rule 1714. Please review the information requested in the attached advance copy of the letter, and if you wish, we can also discuss the information on our scheduled meeting this Thursday for the Redondo Beach Energy Project, where the information requested is similar to that requested for HBEP.

Best regards,
Andrew

P.S. The attached hardcopy letter is being sent through USPS today as well.

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Andrew Lee, P.E.
Air Quality Analysis and Compliance Supervisor
Mechanical, Chemical & Public Services
Engineering & Compliance
(909) 396-2643
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AES Huntington Beach
21730 Newland Street
Huntington Beach, CA 92646
tel 562 493 7891
fax 562 493 7320

March 22, 2013

Mr. Brian Yeh
Senior Manager, Mechanical, Chemical, and Public Services Team
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765-4178

Subject: Huntington Beach Energy Project Permit Application (Facility ID# 115389)

Dear Mr. Yeh:

AES Huntington Beach, LLC (AES-HB) is submitting this letter in response to the South Coast Air Quality Management District's (AQMD) February 19, 2013 request for additional information needed to complete the engineering evaluation and finalization of the Preliminary Determination of Compliance for the Huntington Beach Energy Project (HBEP). The remainder of this letter presents AES-HBD's responses to the requested information.

Carbon Capture and Storage (CCS)

The cost estimate you provided for implementing Carbon Capture and Storage (CCS) for the HBEP was based on a "Capacity Factor Method" and cost prorating. Please provide a more detailed cost breakdown estimate of the technology for each aspect of CCS, as it relates to the HBEP, including the following:

1. Capture and Compression (include sorbent, physical, and chemical adsorption)
2. Transport
3. Storage (include geological for both oil fields and deep saline aquifers, and ocean sequestration)

Please also provide the cost breakdown in the following categories: (1) Material, (2) Equipment, (3) Installation, (4) Engineering, (5) Construction, and (6) Annual Operating Costs.

In addition, the calculation that was performed and submitted which estimated the GHG emissions from the HBEP to be 1,082 lbs CO_2e/MWH did not use the net power output or the total hours of operation for which you have requested the plant to be permitted to operate. Please revise this calculation to be based on the total requested annual hours of operation of the plant (6,835 hrs/yr), the net power output, and include all combustion related GHG pollutants.

Response: The capture of carbon dioxide (CO_2) from industrial gas streams has occurred for decades using several processes to separate CO_2 from other gases. These processes have been used in energy

production and to produce food- and chemical-grade CO_2. In the middle of the century, gas adsorption technologies were developed at refineries for hydrogen production.[1] Three capture technologies are primarily being considered for carbon capture and sequestration (CCS): pre-combustion, post-combustion, and oxy-combustion. Pre-combustion capture refers to a process in which a hydrocarbon fuel is gasified to form a synthetic mixture of hydrogen and carbon monoxide (CO). The CO is converted to CO_2, using shift reactors, and captured before combusting the hydrogen-based fuel. The post-combustion capture technologies include the three methods identified by the AQMD, namely sorbent adsorption, physical adsorption, and chemical absorption. Oxy-combustion technology uses air separators to remove the nitrogen from combustion air so that the combustion products are almost exclusively CO_2, thereby reducing the volume of exhaust gases needed to be treated by the carbon capture system. Of these technologies, the post-combustion technology is most applicable to the Huntington Beach Energy Project (HBEP).

A 2009 review of available CO_2 capture technologies identified 17 facilities worldwide currently in operation, including four natural gas processing facilities and a synthetic gas facility with capture levels exceeding 1 million tons of CO_2 per year (the capture level applicable to power plant emissions). The integration of these existing technologies with power plants represents significant cost and operating issues that need to be addressed in order to facilitate cost-effective deployment of CO_2 capture technologies.[2]

To this end, AES-HB explored the status of CCS development and, based on the Global Carbon Capture and Storage Institute's January 2013 CCS status report,[3] determined that there are a total of 72 large-scale integrated CCS projects (LSIP) in various stages of development worldwide, with four in operation in the U.S., two in Europe, and one each in Canada and Africa. Of the other LSIPs, only eight are at a development stage where final design or contract execution is being considered. The remaining 56 projects are in the identification, evaluation, and project definition stage. Of the 72 projects, 39 are power generation projects with four of these projects developing CCS technologies at natural gas fired power plants. Thus far, a majority of the CCS work has been focused on solid fuel power generation, primarily with integrated gasifier combined cycle designs and oxy-fuel designs.

Given that CCS is being currently employed on electrical generating units regardless of fuel type, the AQMD has requested a more detailed economic evaluation of CCS technology for the HBEP. During a recent meeting with the AQMD, they indicated that AES-HB could use indicative pricing to define the CCS costs for HBEP. After researching indicative CCS costing data, a U.S. Department of Energy (DOE) February 2012 Cost and Performance report[4] shows the cost for installing and operating a CCS system

[1] Report of the Interagency Task Force on Carbon Capture and Storage, United States Department of Energy, August 2010. http://www.fe.doe.gov/programs/sequestration/ccstf/CCSTaskForceReport2010.pdf
[2] ibid
[3] http://www.globalccsinstitute.com/publications/global-status-ccs-update-january-2013
[4] http://bv.com/docs/reports-studies/nrel-cost-report.pdf

on a natural gas fired combined cycle (NGCC) combustion turbine project. Therefore, these data are being used to determine the cost of applying CCS to HBEP.

The DOE report determined the cost for developing a 615 megawatt (MW) NGCC project based on two General Electric Frame 7FA turbines (or equivalent), two heat recovery steam generators (HRSGs), a single reheat steam turbine, a wet mechanical cooling tower, and emission controls for oxides of nitrogen and CO with CCS. Table AQMD-1a presents the installation and operating costs for the above NGCC project with CCS and comparative cost for HBEP.

TABLE AQMD-1A
Cost for a NGCC Power Plant with and without Carbon Capture and Sequestration

Technology	Capital Cost[a] ($/kW)	Variable O&M Cost ($/MWh)	Fixed O&M Cost ($/kW-year)
NGCC	1,230	3.67	6.31
NGCC with CCS[b]	3,750	10	18.4
HBEP – Base Case	< 1,000	< 1.00	~ 6.00

[a] HBEP capital cost calculated based on $1,000 million/1,022,000 kW gross excluding land value, taxes, and insurance.
[b] NGCC with CCS assumes 85 percent carbon capture.

Notes:

kW = kilowatt
O&M = Operations and Maintenance
MWh = megawatt-hour

As shown in Table AQMD-1a, the expected costs of deploying CCS on HBEP would be prohibitive, resulting in over 3 times the HBEP base case capital costs. Additionally, operational variable and fixed costs would increase by a factor of 10 and 3, respectively. Based on the DOE report, the heat rate for the NGCC plant without CCS was estimated at 6,705 British thermal units per kilowatt-hour (Btu/kWh), whereas the heat rate for the NGCC plant with CCS was estimated at 10,080 Btu/kWh.[5] This degradation in heat rate is due to the additional electrical load required to operate the CCS system, resulting in a 33 percent reduction in performance. AES-HB believes that the CCS heat rate degradation would push HBEP's heat rate (reported as 8,416 Btu/kWh-LHV) to over 11,000 Btu/kWh-LHV.

Based on the results of CCS data presented in Table AQMD-1a, an estimate of the costs for incorporating CCS on the HBEP are presented in Table AQMD-1b. These costs assumed that carbon capture systems are currently available, that nearby CO_2 sequestration sites are readily available, and that regulatory/land use issues regarding the siting of a high-pressure CO_2 pipeline and legal issues addressing sequestration are resolved.

[5] http://bv.com/docs/reports-studies/nrel-cost-report.pdf, pages 14 and 16.

TABLE AQMD-1B
Cost Comparison for HBEP with and without Carbon Capture and Sequestration

Technology	Capital Cost ($/kW)	Capital Cost ($)	Variable O&M Cost[a] ($/year)	Fixed O&M Cost[a] ($/Year)	Total Annual O&M Cost ($/Year)
HBEP	<1,000	1,000,000,000	6,510,140	6,132,000	12,642,140
HBEP with CCS[b]	3,520	3,575,440,000	65,101,400	18,804,800	83,906,200
Incremental Cost of CCS[c]	2,520	2,575,440,000	58,591,260	12,672,800	71,264,060

[a] HBEP variable and fixed O&M costs are based on Table AQMD-1a costs, assuming 6,510,140 MWh and 1022,000 kW, respectively.
[b] HBEP with CCS capital cost calculated as $3750/kW - $1230/kW + $1000/kW.
[c] Cost of CCS is the difference between HBEP with CCS and HBEP.

It is clear that based on the DOE study, deploying CCS at HBEP does not appear to be cost effective. It should be noted that the DOE report assumes the NGCC units have a capacity factor (ratio of actual MW produced in a year divided by theoretical MW possible in a year) of 85 percent. AES-HB expects the capacity factor of HBEP to be in the range of 15 to 25 percent with approximately 350 start-ups and shutdowns per year. The intermittent operation of HBEP is not factored into the above cost estimate, but is expected to both reduce the efficiency of the CCS system and increase costs on a dollars per kilowatt (kW) basis.

To respond to the request to base the greenhouse gas (GHG) emissions on the net electrical output, the gross megawatt-hour (MWh) values referenced in the GHG efficiency analysis were not used in calculating the HBEP GHG efficiency. The HBEP GHG efficiency was calculated using the expected operating hours, a CO_2 emission factor in pounds per million British thermal units (lbs/MMBtu), and heat rates.

Performance Standard for GHGs

EPA has issued GHG PSD permits for a number of power plant projects with a CO_2 emission level of less than 1,000 lbs/MWH gross. In addition, EPA has proposed 40 CFR 60 subpart TTTT - New Source Performance Standard for Greenhouse Gas Emissions which would apply to electric utility generating units. This regulation would set forth a CO_2 emission limit of 1,000 lbs/MWH gross, which is expected to be promulgated in the next few months.

4. Your project as currently proposed emits more than 1,000 lbs CO_2/MWH gross. Please provide the AQMD with detailed information demonstrating how you plan to comply with the applicable performance standards for GHG.

Response: U.S. Environmental Protection Agency (EPA) proposed 40 Code of Federal Regulations (CFR), Part 60, Subpart TTTT – New Source Performance Standard for Greenhouse Gas Emissions and received a significant number of comments which may result in changes to the proposed regulation. Until a final regulation is released, providing a detailed demonstration of how HBEP will comply is not possible.

Start Up

5. Please provide a step-by-step process description for the cold start-up of the combustion turbine, combustion turbine generator, heat recovery steam generator, and steam turbine generator. Include the time required from initial start until the steam turbine begins generating power, the time required to reach the load at which the DLN combustors become effective, and the time until ammonia injection begins. Include a discussion of the key design changes from a conventional combined cycle system that allows for the rapid start process. Also please provide the fuel use and power output during the cold, warm, and hot start up periods, as well as the shutdown period.

Response: AES-HB is developing HBEP to provide local capacity and to assist in the integration of renewable energy in support of California's Renewable Portfolio Standard objectives. The HBEP's design accomplishes the project objectives by being able to start up quickly, increase/decrease project electrical output quickly, efficiently generate electricity over a large range of output (120 to 500 MW), and capable of numerous start up and shutdowns. The existing Huntington Beach Generating Station (HBGS) current operations support grid reliability and stability. In order to do so, HBGS requires a significant start up period (over 18 hours) and, as a result, is required to operate overnight at minimum loads to be available for operation the following day, which precludes the use of renewable energy when available. The HBEP avoids this situation by being capable of starting the combustion turbines and achieving approximately 70 percent of the rated electrical output (approximately 720 MW) within 10 minutes of initiating a start up. Furthermore, with multiple combustion turbines and power blocks, HBEP supports electrical grid reliability by being able to operate fewer, smaller units over a wider electrical output rate at a higher thermal efficiency than larger combined-cycle or simple-cycle peaking projects.

The strategy of the design that facilitates meeting HBEP's project objective includes selection of combustion turbines with specific characteristics, HRSG designs/material composition, and steam turbine design. No one design feature enables HBEP to achieve fast starts.

The combustion turbine (CT) start up is initiated by mechanically turning the compressor/turbine rotor to a starting speed. Once rotor starting speed is achieved, fuel combustion is initiated and, after a short stabilization period, the rotor speed is accelerated to rated speed (3,600 revolutions per minute). This is referred to as a full speed – no load (FSNL) condition. After FSNL is achieved, the CT electrical generator is synchronized to the phase of electrical grid and the turbine load is increased. At approximately 70 percent turbine load, the dry low nitrogen oxides (NO_X) combustors revert from the starting mode to the pre-mix mode where they are capable of achieving 9 parts per million (ppm) NO_X and 10 ppm CO emissions.

The HRSGs are specifically designed with materials and operating conditions that do not constrain the fast start and ramp of the CT, yet provide sufficient steam production for enhanced overall efficiency. A steam bypass system provides an easy matching of the steam conditions to the steam turbine (ST) requirements and a de-coupling of the HRSG from the ST, further enabling the short and simplified start-up and operation of the unit. After the CT is started, the HRSGs start producing steam. When the

steam is of sufficient quantity and quality, steam is gradually introduced to the ST. Each HRSG is fitted with a non-return valve and steam sparge line that provides a small amount of steam to the off-service HRSG(s) within the power block. This minimizes the amount of time needed to warm the other HRSG(s) within the power block, allowing the selective catalytic reduction and CO catalysts to reach nominal operating temperature quickly. It is expected that, during staged operation (meaning at least one CT is operating), these components will be maintained at nominal temperature reducing the time required for a start up and minimizing start up emissions.

Shutdown of the power island is fully automatic. Once a shutdown is initiated, the operating CT is unloaded; the generator breakers open automatically and the CT initiates a cool-down and coast-down cycle. Simultaneously, as the CT load is reduced, HRSG steam production is reduced and eventually the steam pressure is reduced. To achieve the fast start times, an ST shutdown is desired from the highest possible pressure to ensure the HRSG remains hot or warm. After CT and ST are electrically disconnected from the grid, the turbine control systems will automatically engage a turning gear; after the turbine rotors have coasted to a stop, the power block will be ready to re-start.

Past Actual Emissions Data

6. Please provide the past 5 years of actual emissions data for Redondo Beach Units 6 and 8, up to and including 2012. Also please provide 2012 past actual emission data for Huntington Beach Units 1 and 2.

Response: Tables AQMD-6a and AQMD-6b present monthly air emissions for the HBGS Units 1 and 2 and the Redondo Beach Generating Station Units 6 and 8, respectively. Tables AQMD-6a and AQMD-6b are also included on the enclosed compact disc.

Modeling

7. After an initial review, AQMD modeling staff determined that both the PSD and criteria pollutant modeling performed for the project was inadequate. Our modeling staff has been in contact with the HBEP consultants to inform them of the deficiencies and request corrections. We are currently waiting for the revised modeling to be completed.

Response: AES-HB received an electronic mail request on January 18, 2013, discussing the need for a revised modeling analysis for the HBEP. Below is a summary of the electronic mail request:

- A 5-year meteorological dataset is required for all Prevention of Significant Deterioration (PSD) projects. The AQMD will provide those files along with the ozone files in a subsequent communication.
- Based on your dispersion modeling analysis, the HBEP will exceed the significant impact level (SIL) for the Federal 1-hour nitrogen dioxide (NO_2) standard. This will require a cumulative analysis of ambient impacts for NO_2. As I explained in our phone conversation, the overly conservative nature of the Federal 1-hour NO_2 project impact analysis contained in your report would cause a larger area within the project impact contour than is necessary when performing the cumulative impact

analysis. It is my understanding that such an analysis has been prepared and will be submitted to the District for our review. Therefore, I am unable to complete my modeling review of this project until the cumulative analysis report is received.

In accordance with the above request, AES-HB contacted the AQMD to acquire a 5-year meteorological dataset, which was provided on February 28, 2013. Using the new meteorological dataset, AES-HB has modeled the HBEP 1-hour NO_2 significant impact area and has prepared the attached addendum to the air dispersion modeling protocol to demonstrate compliance with the Federal 1-hour NO_2 standard. After the AQMD approves the addendum to the modeling protocol and provides the necessary modeling data for nearby emission sources, a revised modeling assessment demonstrating HBEP's compliance with the Federal 1-hour NO_2 ambient air quality standard will be provided by the end of April 2013. This scheduled submittal date is dependent on the timely receipt of emissions data from the AQMD for the nearby emission sources needed for completion of this assessment.

Other GHG Emission Sources

8. If there will be any circuit breakers or any equipment using sulfur hexafluoride (SF6) at the plant, please estimate emissions from those sources of SF6.

Response: AES-HB expects to have approximately 624 pounds of sulfur hexafluoride (SF_6) contained within HBEP circuit breakers. Assuming an annual leak rate of 0.1 percent per year, the HBEP expected SF_6 emissions would be 0.624 pounds per year or 6.8 metric tons of carbon dioxide (equivalent) per year (assuming a global warming potential for SF_6 of 23,900).

Oil/Water Separator

9. If there will be a new oil/water separator at the plant which is not exempt under Rule 219(p)(16), please submit a permit application.

Response: Attached is a completed AQMD Form 400-A and a check in the amount of $5,229.18 for the new oil/water separator.

Construction Schedule

10. AQMD construction permits are valid for 1 year. Additionally, 40 CFR Section 52.21(r) requires that construction commence within 18 months of the permit being issued. This is to insure that projects are reviewed under the most current regulations and considering the latest control technology. The construction schedule as outlined in Table 2.2-1 shows the start of construction for Block 1 as the 1st quarter 2015. The construction for Block 2 is scheduled to begin in the 1st quarter 2018. The construction timeline you have proposed for Block 1 will most likely fall outside the 1 year window for AQMD permits and may even fall outside the 18 month PSD requirement. The Block 2 construction schedule is well outside these limits. Please be aware that AQMD permits can be extended but only in cases where construction has begun and there are extenuating circumstances requiring an extension.

Huntington Beach Energy Project
Table AQMD-6a
Summary of Unit 1 and Unit 2 Past Actual Emissions - Years 2006 - 2012
March 2013

						Criteria Pollutant Emissions (lb)											
		Fuel Usage				VOC		CO		NOx		SOx		PM10		PM2.5	
Year	Month	MSCF (metered)	MMBtu (metered)	CEMS Unit 1 (MSCF)	CEMS Unit 2 (MSCF)	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2	Unit 1	Unit 2
2006	1	737,467	757,840	407,004	321,978	675.3	293.2	116074.8	91826.1	1634.5	1629.97	341.7	270.4	765.8	684.0	465.4	368.2
2006	2	592,096	611,151	265,227	316,957	442.4	290.1	76380.9	91278.2	1788.68	2000.67	223.9	267.6	501.7	676.9	306.3	366.0
2006	3	610,396	626,452	392,303	209,156	652.9	191.0	112093.8	59762.9	1582.08	1174.6	330.4	176.2	740.5	445.8	449.5	239.6
2006	4	438,174	450,819	232,038	201,079	385.0	183.1	66257.4	57417.2	1078.55	1000.53	194.8	168.8	436.6	427.2	265.7	230.2
2006	5	540,206	559,685	229,015	305,730	379.4	278.0	65756.6	87783.6	2031.57	1483.71	192.0	256.3	430.3	648.6	263.7	352.0
2006	6	926,201	954,029	520,065	404,434	854.5	364.7	147228.2	114493.7	2642.09	2391.05	432.4	336.3	969.1	850.9	590.3	459.1
2006	7	1,278,654	1,312,717	649,615	621,365	1071.8	562.6	184063.3	176058.9	4262.46	4088.98	542.4	518.8	1215.6	1312.7	738.0	705.9
2006	8	938,191	967,778	502,797	429,007	830.2	388.8	143259.1	122234.6	2813.85	2217.99	420.2	358.5	941.6	907.1	574.4	490.1
2006	9	901,911	923,712	520,696	371,036	863.7	337.7	147967.0	105437.9	2994.04	2199.78	437.1	311.5	979.5	788.1	593.3	422.8
2006	10	339,933	349,814	110,059	223,785	183.8	205.1	31637.2	64328.6	688.93	1660.34	93.0	189.1	208.4	478.5	126.9	257.9
2006	11	309,535	319,196	0	307,661	0.0	278.6	0.0	87566.0	0.001	1906.81	0.0	256.9	0.0	650.0	0.0	351.1
2006	12	408,895	420,979	339,456	59,656	570.4	55.0	98226.3	17262.2	2062.64	245.76	288.7	50.7	646.9	128.3	393.9	69.2
2007	1	484,177	501,194	303,849	170,410	508.7	156.6	88089.9	49404.3	1851.5	1932.9	257.5	144.4	577.0	365.3	353.2	198.1
2007	2	276,255	287,608	217,609	54,312	362.6	49.7	63141.2	15759.2	1311.5	339.0	183.5	45.8	411.2	115.9	253.2	63.2
2007	3	295,402	306,622	220,094	106,226	326.8	86.5	56734.4	27382.3	1517.7	1539.6	165.4	79.8	370.6	201.9	227.5	109.8
2007	4	450,716	468,038	246,911	204,232	404.6	183.6	70272.7	58125.9	1267.7	1249.8	204.7	169.4	458.8	428.5	281.8	233.1
2007	5	544,007	562,664	434,789	110,161	711.8	99.0	123154.3	31203.2	4395.4	925.1	360.3	91.3	807.3	230.9	493.8	125.1
2007	6	534,772	553,459	455,443	82,673	742.3	73.9	128505.6	23326.6	2856.1	1092.1	375.7	68.2	841.9	172.5	515.3	93.5
2007	7	820,438	844,482	632,248	187,422	1037.9	168.8	178697.2	52972.4	3795.4	1273.0	525.3	155.7	1177.1	394.0	716.5	212.4
2007	8	1,027,836	1,058,299	678,326	349,310	1112.7	314.4	191640.0	98686.7	6743.8	3723.8	563.1	290.0	1261.9	733.7	768.4	395.7
2007	9	643,668	660,627	515,686	125,819	848.6	113.6	145686.8	35545.1	2605.6	1623.5	429.5	104.8	962.4	265.1	584.2	142.5
2007	10	886,810	912,873	697,769	185,850	1148.5	167.9	197758.7	52672.7	4283.2	1055.9	581.2	154.8	1302.5	391.7	793.0	211.2
2007	11	169,711	174,700	166,762	0	278.3	0.0	47926.0	0.0	667.5	0.0	140.9	0.0	315.7	0.0	192.2	0.0
2007	12	415,168	427,289	337,352	72,235	560.8	65.9	96546.7	20673.0	1853.9	759.1	283.8	60.8	636.0	153.8	387.1	82.9
2008	1	1,284,411	1,323,456	672,600	596,616	1116.3	543.4	192401.9	170666.2	3313.93	2929.25	564.9	501.1	1266.0	1267.9	771.5	684.3
2008	2	780,989	802,439	421,174	343,143	705.8	315.6	121304.9	98830.8	2243.96	2758.95	357.2	291.0	800.5	736.3	486.4	396.3
2008	3	553,836	568,535	371,327	176,403	615.8	160.5	105736.6	50231.5	2232.81	1164.86	311.6	148.0	698.4	374.6	424.0	201.4
2008	4	360,096	369,185	343,682	12,658	569.6	11.5	97682.0	3597.7	1956.42	196.32	288.3	10.6	646.0	26.9	391.7	14.4
2008	5	625,079	640,002	468,231	153,690	771.8	139.0	132186.0	43388.0	2280.49	1047.49	390.6	128.2	875.3	324.4	530.0	174.0
2008	6	1,169,212	1,205,087	560,233	608,896	918.8	548.0	158417.5	172178.0	2781.3	3560.37	465.0	505.4	1042.1	1278.8	635.2	690.4
2008	7	1,001,193	1,036,702	547,447	452,107	899.3	407.6	155764.5	128637.4	2460.9	2707.65	455.1	375.9	1019.9	951.0	624.6	515.8
2008	8	1,248,321	1,290,994	672,694	574,419	1104.3	517.5	191035.7	163127.0	3470.28	3378.68	558.9	477.2	1252.4	1207.4	766.0	654.1
2008	9	895,917	926,879	630,731	259,296	1041.2	234.9	180194.9	74078.9	3182.01	1345.8	527.0	216.6	1180.9	548.1	722.5	297.0
2008	10	1,255,388	1,296,083	705,653	545,225	1161.4	492.5	200579.9	154978.8	3934.89	3626.42	587.8	454.2	1317.2	1149.1	804.3	621.4
2008	11	184,989	191,494	25,848	159,461	42.3	143.3	7327.6	45205.6	135.55	753.58	21.4	132.1	48.0	334.3	29.4	181.3
2008	12	542,090	563,487	287,835	250,079	475.7	226.8	82716.7	71866.6	1458.62	1504.78	240.8	209.2	539.5	529.2	331.7	288.2
2009	1	464,386	483,151	451,398	0	761.6	0.0	132544.3	0.0	1869.18	0	385.4	0.0	863.8	0.0	531.5	0.0
2009	2	545,430	563,544	199,963	343,636	329.0	310.3	56869.3	97729.7	901.33	1902.09	166.5	286.2	373.2	724.1	228.0	391.9
2009	3	475,619	493,652	365,795	100,160	612.3	92.0	106314.6	29110.5	1641.89	569.11	309.9	84.9	694.5	214.7	426.3	116.7
2009	4	129,429	134,215	19,511	71,211	45.7	91.4	7918.5	28901.0	115.71	331.27	23.1	84.3	51.8	213.3	31.8	115.9
2009	5	243,667	252,455	97,675	145,475	160.5	131.2	27820.9	41435.9	735.38	1113.81	81.2	121.0	182.1	306.1	111.6	166.1
2009	6	508,853	527,624	380,054	125,660	627.2	113.8	108778.6	35966.2	3304.13	915.11	317.4	104.9	711.3	265.5	436.2	144.2
2009	7	1,157,720	1,199,110	492,397	665,351	807.5	598.8	139906.7	189049.1	4546.2	4248.27	408.7	552.2	915.8	1397.2	561.0	758.0
2009	8	998,955	1,026,933	417,756	575,819	688.8	521.0	118452.0	163269.9	3517.27	4621.21	348.6	480.5	781.2	1215.8	475.0	654.7
2009	9	1,373,053	1,409,966	651,862	717,388	1072.0	647.4	184145.0	202655.6	3496.79	4016.72	542.5	597.1	1215.8	1510.7	738.4	812.6
2009	10	759,607	783,526	463,555	293,475	762.8	265.0	131619.5	83327.8	2799.55	1861.07	386.1	244.4	865.1	618.4	527.8	334.1
2009	11	238,675	246,643	208,561	51	391.3	0.1	67646.1	16.4	2073.59	0	198.1	0.0	443.8	0.1	271.2	0.1
2009	12	204,321	211,737	191,013	10,512	317.6	9.6	55056.8	3029.8	2509.78	64.79	160.7	8.8	360.2	22.4	220.8	12.1
2010	1	296,660	306,228	281,147	13,481	464.3	12.2	80164.7	3843.9	1802.3	229.87	235.0	11.3	526.5	28.5	321.4	15.4
2010	2	301,447	310,406	122,538	179,756	200.4	161.3	34518.4	50636.4	825.56	1094	101.4	148.8	227.3	376.4	138.4	203.0
2010	3	725,711	744,610	72,069	662,330	116.8	589.0	20045.8	184225.5	1068.96	3903.02	59.1	543.2	132.5	1374.4	80.4	738.7
2010	4	177,524	180,962	34,662	144,194	56.4	128.8	9620.9	40023.1	722.05	1032.39	28.6	118.8	64.0	300.6	38.6	160.5
2010	5	329,012	335,634	133,687	195,590	219.1	175.9	37382.8	54692.7	1117.37	1377.58	110.9	162.2	248.5	410.4	149.9	219.3
2010	6	489,074	502,344	217,850	300,317	337.2	255.1	57938.6	79871.2	2981.13	3485.62	170.7	235.3	382.5	595.3	232.3	320.3
2010	7	732,593	752,233	320,019	406,176	529.5	368.8	90939.6	115422.8	2153.41	2331.56	268.0	340.1	600.5	860.5	364.6	462.8
2010	8	1,191,254	1,222,113	552,545	625,435	916.4	569.2	157260.4	178005.9	3843.57	3937.9	463.8	525.0	1039.3	1328.2	630.6	713.8
2010	9	717,386	734,963	376,276	330,827	626.1	302.1	107292.2	94332.8	2491.05	1894.1	316.9	278.6	710.1	704.8	430.2	378.2
2010	10	237,446	242,729	144,021	88,886	240.8	81.6	41175.9	25412.6	1218.45	436.42	121.9	75.2	273.1	190.3	165.1	101.9
2010	11	120,292	122,815	168,833	44	197.2	0.0	33683.6	8.7	1047.48	0.18	99.8	0.0	223.7	0.1	135.1	0.0
2010	12	87,335	89,491	80,603	5,339	134.3	4.9	23025.3	1525.1	849.42	72.82	68.0	4.5	152.4	11.4	92.3	6.1

Redondo Beach Energy Project
Table AQMD-6b
Summary of Facility Past Actual Emissions - Years 2007 - 2012
March 2013

		Criteria Pollutant Annualized Rolling 24 Month Emissions (tons/year)						Annualized Rolling 24 Month GHG Emissions (Metric Tons/year)			Annulized Rolling 24-month Fuel Usage (MMBtu/year)
Year	Month	VOC	CO	NOX	SO2	PM10	PM2.5	CO2	CH4	N2O	
2008	12	11.6	405	13.8	1.26	3.3	2.61	253,326	4.27	0.47	4,742,158
2009	1	11.6	405	13.5	1.26	3.3	2.61	253,377	4.27	0.47	4,743,112
2009	2	11.6	405	13.5	1.26	3.3	2.61	253,399	4.27	0.47	4,743,521
2009	3	11.5	403	13.2	1.25	3.3	2.60	252,092	4.25	0.47	4,719,060
2009	4	12.8	410	14.6	1.39	3.6	2.89	280,639	4.73	0.53	5,253,443
2009	5	14.8	487	15.4	1.62	4.0	3.32	322,224	5.43	0.60	6,031,896
2009	6	14.9	462	15.4	1.62	4.0	3.32	322,214	5.43	0.60	6,031,713
2009	7	14.4	413	15.5	1.57	3.9	3.21	311,742	5.25	0.58	5,835,685
2009	8	12.7	298	13.8	1.39	3.7	2.88	279,624	4.71	0.52	5,234,452
2009	9	13.3	265	15.2	1.45	4.1	3.06	296,885	5.00	0.56	5,557,560
2009	10	13.2	259	15.8	1.44	4.1	3.02	293,086	4.94	0.55	5,486,451
2009	11	13.2	259	15.8	1.44	4.1	3.02	293,086	4.94	0.55	5,486,451
2009	12	13.3	259	15.8	1.45	4.1	3.03	294,176	4.96	0.55	5,506,851
2010	1	13.4	267	16.0	1.46	4.2	3.05	296,625	5.00	0.56	5,552,689
2010	2	13.4	267	16.1	1.46	4.2	3.06	297,297	5.01	0.56	5,565,268
2010	3	13.5	265	16.3	1.46	4.2	3.08	299,038	5.04	0.56	5,597,861
2010	4	13.5	265	16.3	1.46	4.2	3.08	299,038	5.04	0.56	5,597,861
2010	5	12.8	255	15.0	1.39	4.0	2.93	284,362	4.79	0.53	5,323,136
2010	6	12.7	251	14.9	1.38	3.9	2.89	281,071	4.74	0.53	5,261,523
2010	7	12.2	231	14.7	1.33	3.7	2.78	270,268	4.55	0.51	5,059,311
2010	8	13.1	265	15.4	1.43	3.8	2.96	287,634	4.85	0.54	5,384,380
2010	9	12.8	246	15.4	1.39	3.7	2.88	279,949	4.72	0.52	5,240,528
2010	10	12.5	232	15.0	1.36	3.6	2.81	273,281	4.60	0.51	5,115,701
2010	11	10.7	230	14.4	1.16	3.2	2.45	237,488	4.00	0.44	4,445,667
2010	12	10.7	231	15.4	1.16	3.2	2.45	237,940	4.01	0.45	4,454,145
2011	1	12.5	256	16.6	1.36	3.6	2.81	273,308	4.60	0.51	5,116,204
2011	2	14.0	278	18.1	1.52	3.9	3.13	304,182	5.12	0.57	5,694,151
2011	3	14.7	287	18.9	1.60	4.1	3.31	321,246	5.41	0.60	6,013,592
2011	4	13.5	281	17.9	1.47	3.8	3.04	295,196	4.97	0.55	5,525,945
2011	5	11.8	216	18.8	1.28	3.5	2.69	261,206	4.40	0.49	4,889,676
2011	6	11.3	214	19.2	1.23	3.4	2.59	251,482	4.24	0.47	4,707,630
2011	7	9.2	160	17.2	1.00	3.0	2.16	209,559	3.53	0.39	3,922,849
2011	8	9.4	166	17.3	1.02	2.9	2.18	211,600	3.56	0.40	3,961,060
2011	9	8.1	151	15.6	0.88	2.4	1.87	181,560	3.06	0.34	3,398,733
2011	10	8.1	151	15.1	0.89	2.5	1.90	184,392	3.11	0.35	3,451,744
2011	11	8.2	151	15.2	0.89	2.5	1.92	186,302	3.14	0.35	3,487,493
2011	12	8.2	151	15.2	0.89	2.5	1.91	185,212	3.12	0.35	3,467,093
2012	1	8.1	144	15.0	0.88	2.5	1.88	183,070	3.08	0.34	3,426,987
2012	2	8.1	144	15.1	0.88	2.5	1.89	183,219	3.09	0.34	3,429,779
2012	3	8.0	144	15.3	0.87	2.5	1.88	182,559	3.08	0.34	3,417,430
2012	4	10.4	190	18.7	1.13	3.2	2.44	236,572	3.99	0.44	4,428,530
2012	5	12.3	213	21.7	1.34	3.9	2.90	282,075	4.75	0.53	5,280,321
2012	6	12.8	216	22.4	1.39	4.1	3.02	293,745	4.95	0.55	5,498,776
2012	7	13.0	219	22.4	1.41	4.2	3.08	299,079	5.04	0.56	5,598,632
2012	8	14.0	212	24.7	1.52	4.5	3.32	322,576	5.43	0.60	6,038,494
2012	9	14.0	211	24.3	1.52	4.5	3.31	321,679	5.42	0.60	6,021,691
2012	10	14.2	213	26.4	1.55	4.6	3.38	328,281	5.53	0.61	6,145,285
2012	11	14.1	211	25.8	1.54	4.6	3.37	326,958	5.51	0.61	6,120,525
2012	12	14.1	211	25.0	1.54	4.6	3.37	327,307	5.51	0.61	6,127,054

Response: The HBEP construction commences with the demolition of the shutdown peaking turbine (Unit 5)/fuel oil storage tank foundations (scheduled to occur in the 4th quarter of 2014) and ends with the demolition of HBGS Units 1 and 2. Assuming the California Energy Commission issues a license for HBEP by the end of 2013 and the AQMD issues the pre-construction permits shortly thereafter, construction of HBEP shall have commenced within 1 year of the pre-construction permit issuance. HBEP was not proposed as a phased project and construction will be continuous between demolition activities needed to make space for construction of new electrical generating units, consistent with AES-HB's proposed construction schedule presented in Table 2.2-1.

Shutdown Schedule

11. Please indicate the proposed timing for the shutdown of HB Boilers 1 and 2 and RB Boilers 6 and 8, and the methods that will be used to render these units permanently non-operational. As previously requested, please provide a detailed decommissioning plan for each of these units.

Response: The Redondo Beach Generating Station Units 6 and 8 will be shutdown on or before the first fire of HBEP Block 1 turbines. HBGS Units 1 and 2 will be shutdown within 90 days of the commencement of operation of the HBEP Block 2, consistent with Rule 1313(d). AES-HB will submit a plan for rendering these units permanently non-operational 90 days prior to the planned date for decommissioning these units for AQMD review and approval.

Commissioning

12. Please provide an estimate of the quantity of fuel used during each phase of the commissioning period.

Response: Table AQMD-12 presents the HBEP commissioning fuel use on an hourly and per activity basis.

TABLE AQMD-12
HBEP Commissioning Fuel Use

Activity	Duration (hours)	CTG Load (%)	Fuel Use	
			MMscf/hour	MMscf/Activity
CTG Testing (Full Speed No Load, FSNL)	4	5	0.059	0.235
Steam Blows	27	50	0.588	15.882
Set Unit HRSG & Steam Safety Valves	16	100	1.375	22.008
Steam Blows – Restoration				
DLN Emissions Tuning	12	100	1.375	16.506
Emissions Tuning	12	70	1.014	12.165
Emissions Tuning	12	100	1.375	16.506
Restart CTGs and run HRSG in Bypass Mode; STG Bypass Valve Tuning; HRSG Blow Down and Drum Tuning	12	40	0.471	5.647

TABLE AQMD-12
HBEP Commissioning Fuel Use

Activity	Duration (hours)	CTG Load (%)	Fuel Use	
			MMscf/hour	MMscf/Activity
Restart CTGs and run HRSG in Bypass Mode; STG Bypass Valve Tuning; HRSG Blow Down and Drum Tuning	12	75	1.073	12.871
Restart CTGs and run HRSG in Bypass Mode Bypass Valve Tuning; HRSG Blow Down and Drum Tuning	12	100	1.375	16.506
Verify STG on Turning Gear; Establish Vacuum in ACC Ext Bypass Blowdown to ACC (combined blows) Commence tuning on ACC Controls; Finalize Bypass Valve Tuning	12	75	1.073	12.871
Verify STG on Turning Gear; Establish Vacuum in ACC Ext Bypass Blowdown to ACC (combined blows) Commence tuning on ACC Controls; Finalize Bypass Valve Tuning	12	100	1.375	16.506
CT Base Load Testing	12	75	1.073	12.871
Pre-STG Roll Outage and Stack Emissions Test Equipment Installation				
Load Test STG / Combine Cycle (3X1)	24	100	1.375	33.012
Combine Cycle Testing	24	100	1.375	33.012
STG Load Test	24	75	1.073	25.741
Commissioning Duct Burners	24	100	1.873	44.941
No Operation				
Install Temporary Emissions Test Equipment				
Refire Unit with Duct Burners	12	100	1.873	22.471
Source Testing and Drift Test Day 1-5 RATA / Pre-performance Testing/Part 60/75 Certification and Source Testing	168	100	1.375	231.082
Water Wash and Performance Preparation	24	100	1.375	33.012
Performance Testing	24	100	1.375	33.012
CALISO Certification	12	100	1.375	16.506

Note:
MMscf = million standard cubic foot

Combustor Tuning Activities

13. Please provide details regarding the periodic combustor tuning activities proposed for the new turbines. Include the estimated emissions, the frequency, and the duration of these events.

Response: AES-HB does not expect combustor tuning to result in emissions above either the start up/shutdown or normal operating mode.

Health Risk Assessment (HRA)

14. The emission factors used in the HRA are based on AP-42, except for formaldehyde which is based on an assumed concentration of 120 ppb. This is less than the AP-42 factor for this pollutant. There is no justification for the use of the 120 ppb concentration other than it would keep the facility below the major source threshold for NESHAP. Please either provide valid justification for the use of this factor, or revise the calculation to reflect the AP-42 factor.

Response: On the Redondo Beach Energy Project, the AQMD requested AES-HBD to use an AP-42 formaldehyde emission factor of $3.6x10^{-4}$ lbs/MMBtu to analyze the human health risks. Using this formaldehyde emission factor, AES-HBD revised the hazardous air pollutant emissions for the HBEP, as shown in revised permit application Table 5.1B-5R. Using the revised formaldehyde emissions, an updated heath risk assessment is provided below in Table AQMD-14. Attached to this letter is a compact disc with revised dispersion modeling input/output files.

TABLE AQMD-14
HBEP Health Risk Assessment Summary: Individual Units (BASIS: AP-42 Emission Factors)[a, b]

Risk	Turbine 1	Turbine 2	Turbine 3	Turbine 4	Turbine 5	Turbine 6
MICR at the PMIc (per million)	0.62	0.62	0.62	0.61	0.61	0.61
Chronic Hazard Index at the PMI	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019
Acute Hazard Index at the PMI	0.011	0.022	0.020	0.0039	0.0038	0.0058

[a] The results represent the predicted risk for each individual emission unit in accordance with District Rule 1401.
[b] A source with a MICR less than one in 1 million individuals is considered to be less than significant. A chronic or acute hazard index less than 1.0 for each source is considered to be a less-than-significant health risk.
[c] Cancer risk values are based on the Office of Environmental Health Hazard Assessment (OEHHA) Derived Methodology:

Notes:

MICR = maximum individual cancer risk
PMI = point of maximum impact

Using the AQMD's suggested formaldehyde emission factor shows that HBEP would potentially emit 10.6 tons per year of formaldehyde, which is slightly above the National Emissions Standards for Hazardous Air Pollutants (NESHAP) Subpart YYYY threshold of 10 tons per year for an individual hazardous air pollutant (HAP). AES-HB does not believe HBEP is subject to the NESHAP Subpart YYYY as the HAP emission estimate presented in Table 5.1B-5R is based on the CT and duct burners firing at their maximum heat input for all permitted operating hours, including start up/shutdown hours. However, to avoid applicability of NESHAP Subpart YYYY, AES-HB proposes to limit emissions of individual hazardous air pollutant (HAP) to less than 9.9 tons per year and aggregate HAP emissions to less than 24.9 tons per year. Compliance with these emission limits would be demonstrated using measured fuel use and AQMD-approved emission factors or by establishing an equipment-specific formaldehyde emission factor through source testing.

Huntington Beach Energy Project
Table 5.1B.5- Revised (TABLE WAS UPDATED TO REFLECT AP-42 EMISSION FACTORS PER SCAQMD COMMENTS)
Summary of Turbine Operation Emissions – Air Toxics
March 2013

Assume:

Maximum Heat Input Case:	Baseload operation with duct burners firing	
Total Operations (per turbine w/o DB -includes startup and shutdown hours)	6365	hr/yr
Total Operations (per turbine w/ DB)	470	hr/yr
Gas Heat Content	1020	MMBtu/MMSCF
Maximum Hourly Heat Input (per turbine w/o DB)	1498	MMBtu/Hr (HHV)
Maximum Hourly Heat Input (per turbine w/ DB)	2005	MMBtu/Hr (HHV)
Ave Annual Heat Input (per turbine w/o DB)	1403	MMBtu/Hr (HHV)
Ave Annual Heat Input (per turbine w/ DB)	1910	MMBtu/Hr (HHV)
Number of Turbines	6	

Proposed Project	**Emission Factor**		**Emissions (per Turbine)**			**Emissions (Facility Total)**		
Compound	**(Lb/MMCF)[a]**	**(Lb/MMBTU)[a]**	**lb/hr**	**lb/yr**	**TPY**	**lb/hr**	**lb/yr**	**TPY**
Ammonia[c]	5 ppm	-	13.2	86098	43.0	79.3	516586	258.3
Acetaldehyde	0.041	4.00E-05	0.080	393	0.197	0.48	2359	1.2
Acrolein	0.0065	6.40E-06	0.013	63	0.031	0.077	377	0.2
Benzene	0.012	1.20E-05	0.024	118	0.059	0.14	708	0.4
1,3-Butadiene	0.00044	4.30E-07	0.00086	4.23	0.0021	0.0052	25	0.0
Ethylbenzene	0.033	3.20E-05	0.064	314	0.157	0.385	1887	0.9
Formaldehyde[d]	0.367	3.60E-04	0.72	3538	1.77	4.33	21229	10.6
Hexane	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	0.0013	1.30E-06	0.0026	12.8	0.006	0.016	77	0.0
PAHs	0.0022	2.20E-06	0.0044	21.6	0.011	0.026	130	0.1
Propylene (propene)	NA	NA	NA	NA	NA	NA	NA	NA
Propylene Oxide	0.030	2.90E-05	0.058	285	0.143	0.35	1710	0.9
Toluene	0.133	1.30E-04	0.261	1278	0.639	1.56	7666	3.8
Xylene	0.065	6.40E-05	0.128	629	0.314	0.77	3774	1.9
TOTAL HAPs				**6657**	**3.33**		**39941**	**20.0**
TOTAL TACs				**3660**	**1.83**		**21962**	**10.98**

Notes:

[a] Obtained from AP-42, Table 3.1-3 Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines, with the exception of formaldehyde. (lb/MMCF = lb/MMBTU *1020)

[b] Values from the original AFC Appendix Table 5.1B.5, which were obtained from the California Air Toxics Emission Factors (CATEF) database with the exception of formaldehyde and PAHs.

[c] Based on the operating exhaust NH_3 limit of 5 ppmv @ 15% O_2 and a F-factor of 8710.

[d] Emission factor was modified to reflect SCAQMD formaldehyde emission factor of $3.6*10^{-4}$.

If you require further information, please don't hesitate contacting me at 562-493-7840.

Sincerely,

Stephen O'Kane
Manager
AES Huntington Beach, LLC

Attachments

cc: Robert Mason/CH2M HILL
Jennifer Didlo/AES
Melissa Foster/Stoel Rives
Jerry Salamy/CH2M HILL
Felicia Miller/CEC

South Coast Air Quality Management District

Form 400-A

Application Form for Permit or Plan Approval

List only one piece of equipment or process per form.

Mail To:
SCAQMD
P.O. Box 4944
Diamond Bar, CA 91765-0944

Tel: (909) 396-3385
www.aqmd.gov

Section A - Operator Information

1. Facility Name (Business Name of Operator to Appear on the Permit):
AES Huntington Beach, LLC

2. Valid AQMD Facility ID (Available On Permit Or Invoice Issued By AQMD):
115389

3. Owner's Business Name (If different from Business Name of Operator):

Section B - Equipment Location Address

4. Equipment Location Is: (●) Fixed Location ( ) Various Location
(For equipment operated at various locations, provide address of initial site.)

21730 Newland Street
Street Address

Huntington Beach , CA 92646
City Zip

Stephen O'Kane — Vice President
Contact Name — Title

(562) 493-7840 Ext. — (562) 493-7737
Phone # — Fax #

E-Mail: stephen.okane@AES.com

Section C - Permit Mailing Address

5. Permit and Correspondence Information:
☐ Check here if same as equipment location address

690 N. Studebaker Road
Address

Long Beach , CA 90803
City State Zip

Stephen O'Kane — Vice President
Contact Name — Title

(562) 493-7840 Ext. — (562) 493-7737
Phone # — Fax #

E-Mail: stephen.okane@AES.com

Section D - Application Type

6. The Facility Is: ( ) Not In RECLAIM or Title V ( ) In RECLAIM ( ) In Title V (●) In RECLAIM & Title V Programs

7. Reason for Submitting Application (Select only ONE):

7a. New Equipment or Process Application:
- ( ) New Construction (Permit to Construct)
- ( ) Equipment On-Site But Not Constructed or Operational
- ( ) Equipment Operating Without A Permit *
- ( ) Compliance Plan
- ( ) Registration/Certification
- ( ) Streamlined Standard Permit

7b. Facility Permits:
- (●) Title V Application or Amendment (Also submit Form 500-A1)
- ( ) RECLAIM Facility Permit Amendment

7c. Equipment or Process with an Existing/Previous Application or Permit:
- ( ) Administrative Change
- ( ) Alteration/Modification
- ( ) Alteration/Modification without Prior Approval *
- ( ) Change of Condition
- ( ) Change of Condition without Prior Approval *
- ( ) Change of Location
- ( ) Change of Location without Prior Approval *
- ( ) Equipment Operating with an Expired/Inactive Permit *

Existing or Previous Permit/Application
If you checked any of the items in 7c., you MUST provide an existing Permit or Application Number:

* A Higher Permit Processing Fee and additional Annual Operating Fees (up to 3 full years) may apply (Rule 301(c)(1)(D)(i)).

8a. Estimated Start Date of Construction (mm/dd/yyyy):	8b. Estimated End Date of Construction (mm/dd/yyyy):	8c. Estimated Start Date of Operation (mm/dd/yyyy):
4/01/2015	09/01/2022	07/01/2020

9. Description of Equipment or Reason for Compliance Plan (list applicable rule):
Oil/Water Separator

10. For identical equipment, how many additional applications are being submitted with this application? (Form 400-A required for each equipment / process)

11. Are you a Small Business as per AQMD's Rule 102 definition? (10 employees or less and total gross receipts are $500,000 or less OR a not-for-profit training center) (●) No ( ) Yes

12. Has a Notice of Violation (NOV) or a Notice to Comply (NC) been issued for this equipment? (●) No ( ) Yes
If Yes, provide NOV/NC#:

Section E - Facility Business Information

13. What type of business is being conducted at this equipment location?
Electrical Power Generation

14. What is your business primary NAICS Code? (North American Industrial Classification System) 221112

15. Are there other facilities in the SCAQMD jurisdiction operated by the same operator? ( ) No (●) Yes

16. Are there any schools (K-12) within 1000 feet of the facility property line? (●) No ( ) Yes

Section F - Authorization/Signature

I hereby certify that all information contained herein and information submitted with this application are true and correct.

17. Signature of Responsible Official: S O'Kane

18. Title of Responsible Official: Manager

19. I wish to review the permit prior to issuance. (This may cause a delay in the application process.) ( ) No (●) Yes

20. Print Name: Stephen O'Kane

21. Date: 03/25/2013

22. Do you claim confidentiality of data? (If Yes, see instructions.) (●) No ( ) Yes

23. Check List: ☒ Authorized Signature/Date ☒ Form 400-CEQA ☒ Supplemental Form(s) (ie., Form 400-E-xx) ☒ Fees Enclosed

AQMD USE ONLY	APPLICATION TRACKING #	CHECK #	AMOUNT RECEIVED $	PAYMENT TRACKING #	VALIDATION

DATE	APP REJ	DATE	APP REJ	CLASS I III	BASIC CONTROL	EQUIPMENT CATEGORY CODE	TEAM	ENGINEER	REASON/ACTION TAKEN

Modeling Protocol Addendum

Dispersion Modeling Protocol for the Huntington Beach Energy Project

Prepared for

AES Huntington Beach, LLC

690 N. Studebaker Road
Long Beach, CA 90803

March 22, 2013

Submitted to

South Coast Air Quality Management District

Prepared by

CH2MHILL
2485 Natomas Park Drive, Suite 600
Sacramento, CA 95833

Addendum to the Air Dispersion Modeling Protocol

Introduction

AES Huntington Beach, LLC, (AES) proposes to construct the Huntington Beach Energy Project (HBEP or Project) at the existing AES Huntington Beach Generating Station (HBGS) site at 21730 Newland Street, Huntington Beach, CA 92646. The HBEP will consist of two three-on-one combined-cycle power blocks with a net capacity of 939 megawatts. Each power block will consist of three Mitsubishi Power Systems Americas (MPSA) 501DA combustion turbines, one steam turbine, and an air cooled condenser. Each combustion turbine will be equipped with a heat recovery steam generator (HRSG) and will employ supplemental natural gas firing (duct firing). The turbines will use advanced combustion controls, dry low oxides of nitrogen (NO_x) burners, and selective catalytic reduction to limit NO_x emissions to 2 parts per million by volume (ppmv). Emissions of carbon monoxide (CO) and volatile organic carbon (VOC) will be limited to 2 and 1 ppmv, respectively, through the use of the advanced combustion controls, combined with the use of an oxidation catalyst. Good combustion practices and burning pipeline-quality natural gas will minimize emissions of the remaining pollutants.

The prevention of significant deterioration (PSD) permit application was initially submitted to the South Coast Air Quality Management District (SCAQMD) on June 22, 2012 with the understanding that SCAQMD would forward copies of the permit application to U.S. Environmental Protection Agency (EPA) Region 9. The permit application did not include a complete 1-hour nitrogen dioxide (NO_2) modeling demonstration for comparison to the National Ambient Air Quality Standards (NAAQS). On July 24, 2012, the SCAQMD requested that AES submit a copy of the PSD permit application directly to EPA Region 9. AES submitted the PSD permit application to EPA Region 9 on September 22, 2012. However, on January 10, 2013, the SCAQMD was notified that EPA Region 9 was transferring jurisdiction for issuing the HBEP PSD permit from EPA Region 9 to the SCAQMD. The PSD permit application is currently under review by the SCAQMD; however, the Project is required to demonstrate compliance with the 1-hour NO_2 NAAQS before the final PSD permit can be granted.

The 1-hour NO_2 standard is 100 parts per billion (ppb), or 188 micrograms per cubic meter ($\mu g/m^3$), based on the 3-year average of the 98th-percentile of the annual distribution of daily maximum 1-hour concentrations. The final rule for the 1-hour NAAQS was published in the Federal Register on February 9, 2010, and became effective on April 12, 2010.

Purpose of the Protocol

This protocol discusses the modeling methodology to be used in evaluating the 1-hour NO_2 ambient air quality standard. The 1-hour NO_2 modeling approach for this Project is based on the EPA *Notice Regarding Modeling for New Hourly NO_2 NAAQS* (EPA, February 2010), *Additional Clarification Regarding Applicability of Appendix W Modeling Guidance for the 1-Hour NO_2 NAAQS* (EPA, March 2011), *EPA's Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program* (EPA, June 29, 2010), and the *Applicability of Appendix W Modeling guidance for the 1-hour NO_2 National Ambient Air Quality Standard* (EPA, June 28, 2010). These documents are available on EPA's website (www.epa.gov/ttn/scram).

As required by the guidance, this protocol is submitted to present the methodology to be used in the 1-hour NO_2 modeling analysis, and the justifications for using the following model settings and options:

- NAAQS cumulative modeling including domain and competing sources
- Use of plume volume molar ratio method (PVMRM) modeling tool for better characterizing the conversion of NO_x to NO_2
- The in-stack ratio of NO_2/NO_x and ambient ratio of NO_2 used in PVMRM
- The approach of pairing hourly NO_2 modeling data and background monitoring data
- Selection of background hourly NO_2 and ozone (O_3) data

Even though the PVMRM procedures are well recognized and a generally accepted method for characterizing the conversion of NO_x to NO_2, the use of non-default AERMOD options makes the PVMRM no longer a "preferred model", and requires justification and approval by EPA's Regional Office or SCAQMD on a case by case basis.

PSD Significant Impact Level

In June 2010, EPA issued a memorandum *Guidance Concerning the Implementation of the 1-Hour NO_2 NAAQS for the Prevention of Significant Deterioration Program* (EPA, June 29, 2010). In this guidance memorandum, EPA sets forth a recommended interim 1-hour NO_2 significant impact level (SIL) of 4 ppb (7.6 µg/m^3) for the PSD air quality analysis for NO_2 until EPA promulgates a 1-hour NO_2 SIL via rulemaking.

EPA requires the interim SIL to be compared to the 5-year average of the maximum modeled 1-hour NO_2 concentration predicted each year at each receptor, based on 5-years of National Weather Service data, or 1 to 5 years of site-specific data. If the modeled concentration is greater than the SIL, cumulative modeling to include competing sources within the impact area is required.

The Project's estimated NO_x emission increase would be greater than 40 tons per year and, based on a preliminary screening modeling of 1-hour NO_2, the incremental 1-hour NO_2 modeled concentration increase is expected to exceed the interim SIL proposed by EPA. Therefore, cumulative 1-hour NO_2 modeling will be conducted to determine compliance with the NAAQS. A description of the full 1-hour NAAQS analysis is described below.

Dispersion Modeling Methodology

The EPA approved AERMOD modeling system (Version 12345) will be used for the 1-hour NO_2 modeling demonstration. The following supporting pre-processing programs for AERMOD will also be used:

- BPIP-Prime (Version 04274)
- AERMAP (Version 11103)

Project combustion turbines will be modeled as point sources within AERMOD. Emission rates and other source parameters were determined from the manufacturer's data, which were submitted with the original permit application on June 22, 2012.

AERMOD is a steady-state plume model that simulates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain. This model is recommended for short-range (< 50 kilometers [km]) dispersion from the source. The model incorporates the Plume Rise Model Enhancement (PRIME) algorithm for modeling building downwash. AERMOD is designed to accept input data prepared by two specific pre-processor programs, AERMET and AERMAP. AERMOD will be run with the following options:

- Direction-specific building downwash
- Actual receptor elevations and hill height scales obtained from AERMAP
- PVMRM (described further below)

Source Characterization

All proposed sources will be modeled as point sources. Source locations, stack parameters, and emissions rates will be consistent with the original permit application submitted on June 22, 2012.

Building Downwash

Building influences on stacks are calculated by incorporating the updated EPA Building Profile Input Program for use with the plume-rise model-enhancement algorithm (BPIP-PRIME). The stack heights used in the dispersion modeling will be the actual stack height or Good Engineering Practice (GEP) stack height, whichever is less.

Meteorological Data

AERMOD will be modeled with 5 years of data collected at the Costa Mesa meteorological monitoring station, owned and operated by the SCAQMD. This station was selected because it is very near the project site (6 km north east of the project site) and the winds are considered representative of the area. Five complete years of meteorological data collected from 2005 to 2009 were processed by SCAQMD with the AERMET meteorological data preprocessor. Figure 1 shows the 5-year wind rose for the Costa Mesa station.

Receptors

The ambient air boundary will be defined by the fence line surrounding the project site. The selection of receptors in AERMOD will be as follows:

- The first SIL run will use a nested Cartesian grid as follows:
  - 30-meter (m) spacing along the fence line
  - 50-m spacing from the fence line to 500 m from the origin
  - 100-m spacing from beyond 500 m to 3 km from the origin
  - 500-m spacing from beyond 3 km to 10 km from the origin
  - 1,000-m spacing from beyond 10 km to 25 km from the origin
  - 5,000-m spacing from beyond 25 km to 50 km from the origin
- A competing source run for comparison to the 1-hour NO_2 NAAQS will only include receptors identified in the first run as above the SIL.
- Receptor elevations will be calculated by AERMAP as described below.

AERMAP (Version 11103) will be used to process terrain elevation data for all sources and receptors using National Elevation Dataset (NED) files prepared by the U.S. Geological Survey (USGS). AERMAP first determines the base elevation at each source and receptor. For complex terrain situations, AERMOD captures the physics of dispersion and creates elevation data for the surrounding terrain identified by a parameter called hill height scale. AERMAP creates hill height scale by searching for the terrain height and location that has the greatest influence on dispersion for each individual source and receptor. Both the base elevation and hill-height scale data are produced for each receptor by AERMAP as a file or files that can be directly accessed by AERMOD.

All receptors and source locations will be expressed in the Universal Transverse Mercator North American Datum 1983 (NAD83), Zone 10 coordinate system.

FIGURE 1

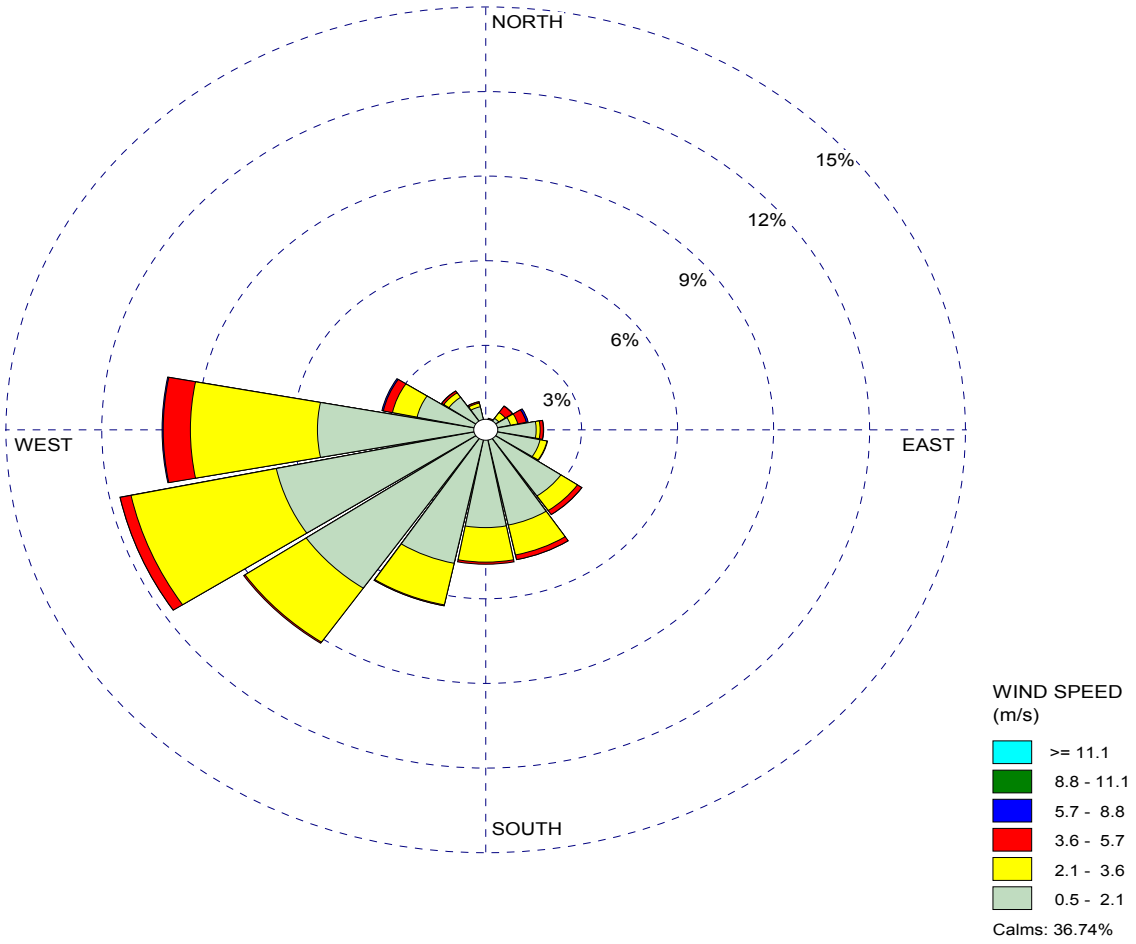
Costa Mesa 5-year Wind Rose

WIND ROSE PLOT:

Costa Mesa Meteorological Data
Annual Wind Rose (2005-2009)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS: SCAQMD Processed AERMET	DATA PERIOD: **2005-2009** **Jan 1 - Dec 31** **00:00 - 23:00**	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **36.74%**	TOTAL COUNT: **41682 hrs.**	
	AVG. WIND SPEED: **1.11 m/s**	DATE: **3/12/2013**	PROJECT NO.: **HBEP**

WRPLOT View - Lakes Environmental Software

Monitored Background NO_2 Concentrations

Three complete years of available ambient NO_2 background concentration data for NO_2 from the SCAQMD Costa Mesa monitoring station will be used for this analysis. This site was chosen because it is downwind of the HBEP site for the most prevalent meteorological conditions and is in close proximity to the meteorological monitoring tower.

Table 1 shows the monitored concentrations at the Costa Mesa Station for NO_2.

TABLE 1
Ambient NO_2 Background Concentrations in µg/m^3

Pollutant	Value Description	2008	2009	2010
NO_2	1-hour*	120.4	107.2	105.4
	Annual	24.8	24.5	21.3

* 98th percentile value

Season hour-of-day background NO_2 concentrations will be determined by following the most recent EPA NO_2 modeling guidance (EPA, March 2011). This includes using the third-highest concentration for each hour of day, by season, at the NO_2 monitor. AERMOD will automatically combine the modeled NO_2 concentration to the appropriate background concentration for each hour to determine the model design concentration for comparison to the NAAQS. The values used for the 1-hour background NO_2 concentrations by hour-of-day are summarized in Table 2.

TABLE 2
Ambient 98th Percentile Season Hour of Day NO_2 Concentrations (ppb)

Hour of Day	Winter	Spring	Summer	Autumn
0	47.0	30.0	17.5	42.0
1	42.0	35.0	20.8	40.0
2	40.0	36.0	23.3	37.0
3	38.0	36.0	24.0	37.0
4	38.0	37.0	27.0	37.0
5	36.0	37.0	27.0	37.0
6	39.0	43.0	31.2	38.0
7	45.0	44.0	35.0	49.0
8	51.0	41.0	40.2	61.0
9	54.0	34.0	37.0	61.0
10	51.0	22.0	30.3	68.0
11	44.0	28.0	23.0	55.0
12	47.0	28.0	21.7	51.0
13	45.0	14.0	16.0	54.0
14	58.0	13.0	15.0	53.0
15	54.0	10.0	14.0	50.0
16	45.0	10.0	15.0	44.0
17	52.0	19.0	15.0	52.0
18	54.0	21.0	20.0	59.0
19	53.0	34.0	22.0	56.0
20	51.0	46.0	19.0	59.0
21	54.0	45.0	19.0	56.0
22	49.0	52.0	21.0	47.0
23	48.0	40.0	28.0	45.0

ppb = part(s) per billion

1-Hour NAAQS Modeling Steps

Turbine Load Analysis

Turbine emissions and stack parameters, such as flow rate and exit temperature, will exhibit some variation with ambient temperature and operating load. Therefore, the combustion turbines will undergo a load analysis at 70 percent, 80 percent, 90 percent, and 100 percent load for three different temperatures of 32 degrees Fahrenheit (°F), 65.8°F, and 110°F. These loads and temperatures were selected based on anticipated demand on the combustion turbines and the range of temperatures expected at the project site. Additionally, startup and shutdown emissions will also be included in the load analysis.

The above loads and temperature will be evaluated for firing on natural gas with or without duct burning, as applicable. The load and ambient condition that results in the highest predicted 1-hour NO_2 concentration will be used for the project analysis. This analysis will also be used to demonstrate NAAQS compliance for the attainment pollutants (NO_2 annual averaging period, CO, and sulfur dioxide [SO_2]) using the 5-year meteorological data set provided by the SCAQMD. Procedures outlined in the protocol submitted to SCAQMD on June 22, 2012 will be used to complete the analysis for other pollutants and averaging times and will not be further addressed in this protocol.

Preliminary SIL Analysis

Using the worst-case load identified in the load analysis for the combustion turbines, the preliminary analysis of the Project for 1-hour NO_2 will be conducted as follows:

- If the predicted impacts are not significant (that is, less than the SIL) for 1-hour NO_2, the modeling is complete and it is assumed that the proposed Project would not cause or significantly contribute to a modeled exceedance of the NAAQS.
- If impacts are above the SIL, a more refined analysis will be conducted as described below.

Refined Analysis

Comparison to the NAAQS will involve the following:

- For 1-hour NO_2 concentrations greater than the respective SIL, the significant impact area (that is, the significant impact radius) will be defined. Preliminary modeling indicated that the Project may be significant for 1-hour NO_2 with a significant impact radius of 2.7 km from the project site.
- Only receptors identified as above the SIL in the preliminary analysis section, described above, will be included in the refined analysis.
- The maximum modeled design concentration will be determined and compared to the NAAQS. For the NAAQS analysis, this maximum modeled design concentration will include contributions from the facility, competing nearby sources, and background concentrations by season and hour of the day, described above.
- SCAQMD will be contacted to identify competing nearby and increment consuming sources, and exhaust characteristics, if available, for inclusion in the refined analysis. The section below summarizes the approach to develop the competing source inventory.
- Background concentrations described above will be included in the refined NAAQS analysis.

Competing Source Inventory

As mentioned above, preliminary modeling indicates that the SIL may be exceeded and the significant impact radius extends approximately 2.7 km from the project site. AES understands that SCAQMD will assist in developing a preliminary competing source inventory for conducting the 1-hour NO_2 competing source analysis.

After the preliminary competing source inventory is prepared, AES proposes to discuss inventory refinements with the SCAQMD before the competing source NAAQS is performed. For example, AES proposes to identify sources that are inappropriate for inclusion in the refined 1-hour NO_2 NAAQS analysis and modify the inventory initially

provided by the SCAQMD. Following this discussion, SCAQMD will approve a final competing source inventory for AES's use. AES will apply the final, approved inventory of competing sources to complete the refined NAAQS analysis. For the refined NAAQS analysis, allowable emissions from the sources identified on the final inventory will be modeled.

As mentioned above, preliminary SIL modeling indicates that the significant impact radius only extends 2.7 km from the project site. Figure 2 shows the anticipated significant impact radius. Based on this significant impact radius and representative location of the ambient monitor, competing sources beyond the distance to the ambient monitor (6 km) would not be required for the analysis. It would be assumed that the ambient monitor would conservatively include impacts from regional and major sources beyond that distance. Regional sources assumed to be included in the background monitor concentrations would be impacts from road sources and minor sources. Major sources beyond 6 km would also be assumed to be included in the monitored background concentrations because pollutant concentrations from major sources beyond 6 km east of the facility would be captured by the monitor. Also, because HBEP is located on the coastline, it is assumed there are not any major sources to the west of the facility. Therefore, AES is requesting a competing source list from SCAQMD for NO_x emitting sources within 6-km of the Huntington Beach project site.

Refined 1-hour NO_2 Analysis

Emergency diesel equipment will not be included in the 1-hour NO_2 NAAQS modeling analysis. Consistent with recent EPA guidance addressing intermittent emissions for the 1-hour NO_2 analysis (EPA, 2011), exclusion of emergency diesel equipment is appropriate. Startup emissions from the HBEP turbines will be included for the 1-hour NAAQS modeling since startups of the units are expected to frequently occur.

Further refinements of the 1-hour NO_2 modeling include the use of PVMRM and the incorporation of seasonal hour-of-day NO_2 background concentrations in AERMOD. PVMRM options will assume an initial in-stack NO_2/NO_x ratio of 0.5 and an ambient NO_2 ratio of 0.8. Corresponding hourly ozone data for PVMRM will be obtained from the Costa Mesa ozone monitoring station. SCAQMD has provided the background hourly ozone data to use with the PVMRM analysis.

To complete the refined 1-hour NO_2 NAAQS modeling analysis, hourly emissions from the competing sources identified on SCAQMD's final inventory will be modeled by apportioning each source's tons per year permitted emissions evenly throughout the year, unless otherwise noted.

The model design concentration of the 5-year average of the 98th percentile hourly impact at each receptor will be compared to the 1-hour NO_2 NAAQS of 188 $\mu g/m^3$.

If the model design concentration at any receptor exceeds the NAAQS, the Project impacts during the NAAQS exceedances would be evaluated and compared to the SIL. If the Project's impacts are below the SIL during all modeled exceedances of the NAAQS, then the Project would be assumed to not significantly contribute to the modeled exceedances.

Output – Presentation of Results

The results of the 1-hour NO_2 air dispersion modeling analysis will be presented as follows:

- A description of modeling methodologies and input data
- A summary of the results in tabular and, where appropriate, graphical and narrative form
- Modeling files used for AERMOD will be provided with the application on a compact disc
- Any significant deviations from the methodology proposed in this protocol will be presented

References

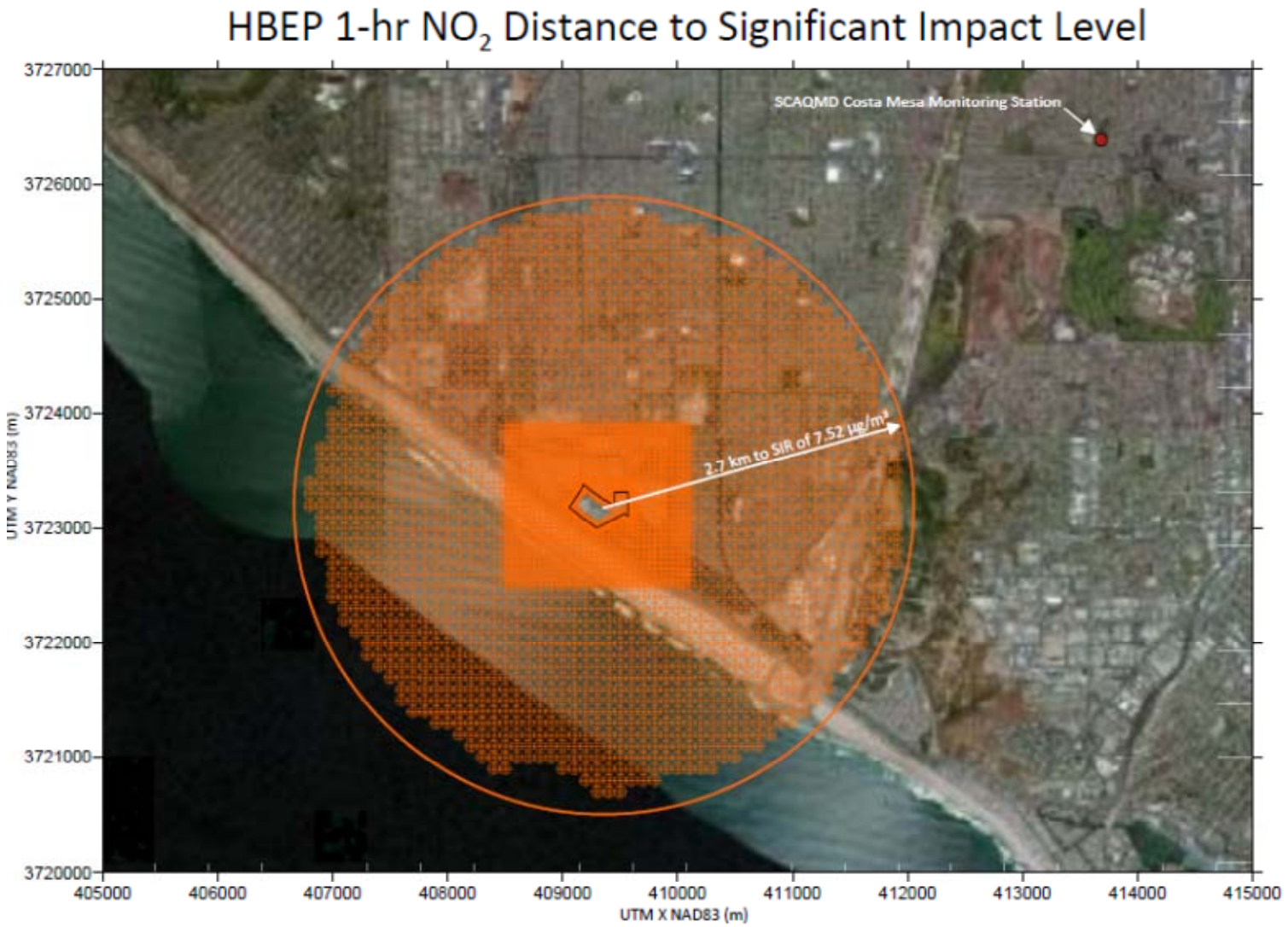
EPA. 2010. *Notice Regarding Modeling for New Hourly NO_2 NAAQS*. February.

EPA. 2010. *Applicability of Appendix W Modeling guidance for the 1-hour NO_2 National Ambient Air Quality Standard*. June 28.

EPA. 2010. *EPA's Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program*. June 29.

EPA. 2011. *Additional Clarification Regarding Applicability of Appendix W Modeling Guidance for the 1-Hour NO_2 NAAQS*. March.

FIGURE 2
HBEP 1-Hour NO_2 SIL Analysis Results



BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION FOR THE HUNTINGTON BEACH ENERGY PROJECT

Docket No. 12-AFC-02

PROOF OF SERVICE
(Revised 03/26/2013)

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1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.ca.gov

*indicates change

OTHER ENERGY COMMISSION PARTICIPANTS (LISTED FOR CONVENIENCE ONLY):

After docketing, the Docket Unit will provide a copy to the persons listed below. Do not send copies of documents to these persons unless specifically directed to do so.

ANDREW McALLISTER
Commissioner and Presiding Member

KAREN DOUGLAS
Commissioner and Associate Member

Susan Cochran
Hearing Adviser

Hazel Miranda
Adviser to Commissioner McAllister

Patrick Saxton
Adviser to Commissioner McAllister

Galen Lemei
Adviser to Commissioner Douglas

Jennifer Nelson
Adviser to Commissioner Douglas

Eileen Allen
Commissioners' Technical
Adviser for Facility Siting

DECLARATION OF SERVICE

I, Judith M. Warmuth, declare that on March 27, 2013, I served and filed copies of the attached Applicant's Submittal dated March 27, 2013 of Air Quality Correspondence dated March 25, 2013. This document is accompanied by the most recent Proof of Service, which I copied from the web page for this project at: http://www.energy.ca.gov/sitingcases/huntington_beach_energy/index.html.

The document has been sent to the other parties on the Service List above in the following manner:

(*Check one*)

For service to all other parties and filing with the Docket Unit at the Energy Commission:

☒ I e-mailed the document to all e-mail addresses on the Service List above and personally delivered it or deposited it in the US mail with first class postage to those parties noted above as "hard copy required"; **OR**

☐ Instead of e-mailing the document, I personally delivered it or deposited it in the US mail with first class postage to all of the persons on the Service List for whom a mailing address is given.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that I am over the age of 18 years.

Dated: March 27, 2013

Judith M. Warmuth