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Alamitos Energy Center

(13-AFC-01)

Applicant's Opening Testimony, Part 2

Submitted to

California Energy Commission

Prepared by

AES Alamitos Energy, LLC

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Contents

Introduction

Attached is AES Alamitos Energy, LLC's (the Applicant) testimony in support of the Alamitos Energy Center (AEC) (13-AFC-01) evidentiary hearings. In addition, the Applicant's testimony also constitutes the Applicant's comments on Part 2 of the California Energy Commission's (CEC) Final Staff Assessment (FSA) (Transaction Number [TN] #214704). Declarations and resumes for each witness are also provided, following the testimony.

Air Quality

I. Introduction

A. Name: Elyse Engel, Benjamin Beattie, Jerry Salamy, and Stephen O'Kane

B. Qualifications: The panel's qualifications are as noted in their resumes contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony incorporates by reference the following documents submitted in this proceeding:

- Exs. 1500-1508, AES Alamitos Energy, LLC, Supplemental Application for Certification, Alamitos Energy Center, Volumes 1 and 2 (13-AFC-01) (TN #206427-1 through 206427-6 and 206428-1 through 206428-3), October 23, 2015.
- Ex. 1026, CH2M HILL, Alamitos Energy Center (13-AFC-01) Supplemental Application for Certification Air Dispersion Modeling Files and Appendix 5.14A – 2015 EMS Phase I ESA Report (TN #206433), October 23, 2015.
- Ex. 1032, AES Southland Development, LLC, Alamitos Energy Center (13-AFC-01) Data Responses, Set 6 (Response to Data Requests 83 to 168) (TN #207013), December 14, 2015.
- Ex. 1034, AES Alamitos Energy, LLC, Alamitos Energy Center Air Permit Application Completeness Response (TN #207265), January 7, 2016.
- Ex. 1036, CH2M HILL, Correspondence with SCAQMD Regarding AES Alamitos—AEC Questions Set No. 3 – Corrected (TN #210269), January 28, 2016.
- Ex. 1037, CH2M HILL, Correspondence with SCAQMD Regarding AES Alamitos—AEC Questions Set No. 5 (TN #210354), February 17, 2016.
- Ex. 1039, CH2M HILL, Correspondence with SCAQMD Regarding AES Alamitos—AEC Questions Set No. 6 (TN #210533), February 25, 2016.
- Ex. 1041, AES Alamitos Energy, LLC, Alamitos Energy Center (13-AFC-01): Removal of Temporary Secondary Construction Access Road (TN #210632), March 7, 2016.
- Ex. 1043, AES Southland Development, LLC, Alamitos Energy Center (13-AFC-01) Data Response Set 6-R1 (Revised and Updated Data Responses 131 to 133, Air Quality) (TN #210780), March 17, 2016.
- Ex. 1044, AES Alamitos Energy, LLC, Alamitos Energy Center Supplemental Application for Certification Revisions (Facility ID 115394) (TN #210805), March 17, 2016.
- Ex. 1045, CH2M HILL, Correspondence with SCAQMD Regarding AEC Questions Set No. 7 (TN #210806), March 22, 2016.
- Ex. 1047, AES Alamitos Energy, LLC, Alamitos Energy Center Supplemental Application for Certification (13-AFC-01) Revised Air Quality, Biological Resources, and Public Health Assessment (TN #211013), April 12, 2016.
- Ex. 1048, AES Southland Development, LLC, Alamitos Energy Center (13-AFC-01) Data Response Set 6-R2 (Revised and Updated Data Response to 133, Air Quality) (TN #211169), April 21, 2016.
- Ex. 1053, CH2M HILL, Correspondence with SCAQMD Regarding AES Alamitos – Inversion Break-Up (TN #211997), May 2, 2016.
- Ex. 1049, CH2M HILL, Correspondence with SCAQMD Regarding Update on Public Records Requests (TN #211419), May 10, 2016.

- Ex. 1058, AES Alamitos Energy, LLC, AES Alamitos, LLC (Facility ID 115394) Preliminary Determination of Compliance Comments (TN #212724), July 19, 2016.
- Ex. 1059, AES Southland Development, LLC, Alamitos Energy Center (13-AFC-01) Preliminary Staff Assessment Summary of PSA Workshop and Supplemental Comments (TN #212771), August 12, 2016.
- Ex. 1056, AES Southland Development, LLC, Alamitos Energy Center (13-AFC-01) Preliminary Staff Assessment Initial Comments (TN #212487), July 27, 2016.
- Ex. 1057, AES Alamitos Energy, LLC, Verification of the Public Notice Distribution for the Alamitos Energy Center Project Permit Application (Facility ID# 115394) (TN #212493), July 28, 2016.
- Ex. 1060, CH2M, Record of Conversation: Review Air Quality and GHG Comments on AEC PSA (TN #212788), August 10, 2016.
- Ex. 1061, CH2M HILL, Alamitos Energy Center Supplemental Application for Certification (13-AFC-01) Correspondence with SCAQMD Regarding Cumulative Source Assessment (TN #212799), August 15, 2016.
- Ex. 1062, AES Southland Development, LLC, Alamitos Energy Center (13-AFC-01) Data Responses Set 6-R3 (Revised and Updated Data Responses to 131 to 133, Air Quality) (TN #212822), August 17, 2016.
- Ex. 1063, AES Southland Development, LLC, Alamitos Energy Center (13-AFC-01) Data Response Set 6-R4 (Revised and Updated Data Response to 133, Air Quality) (TN #212885), August 22, 2016.
- Ex. 1065, CH2M, Alamitos Energy Center – Supplemental Application for Certification (13-AFC-01), Staff's Data Requests, 133 (TN #212930), August 19, 2016.
- Ex. 1069, CH2M HILL, Alamitos Energy Center SOx Emission Reduction Credit Certificate (TN #214090), October 18, 2016.
- Ex. 1071, CH2M, Alamitos Energy Center Preliminary Determination of Compliance Revisions (Facility ID 115394) (TN #214175), October 26, 2016.
- Ex. 1605, CH2M, Alamitos Energy Center Determination of Compliance Revisions (Facility ID 115394) (TN #214373), November 4, 2016.
- Ex. 1606, AES Alamitos Energy, LLC, Verification of the Public Notice Distribution for the Alamitos Energy Center Permit Application (Facility ID 115394) (TN #214636), December 5, 2016.
- Ex. 1607, AES Alamitos Energy, LLC, AES Alamitos, LLC (Facility ID 115394) Draft Facility Permit to Operate and Final Determination of Compliance Comments (TN #214637), December 5, 2016.

All of the facts contained in this testimony (including all referenced documents) are true and correct to the best of our knowledge and belief. To the extent this testimony contains opinions, such opinions reflect our best professional judgment. We make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

II. Summary of Testimony

Construction and operation of the AEC will result in emissions of criteria pollutants and greenhouse gases (GHGs). Potential impacts associated with construction emissions have been reduced through the use of best management practices and mitigation measures to less than significant. Potential emissions from operation have been minimized through project design and control measures including, most

notably, the turbine selection process and implementation of Best Available Control Technology (BACT), as defined by the South Coast Air Quality Management District (SCAQMD). Criteria pollutant (and precursor) emissions will also be mitigated through the surrender of emission reduction credits and through the SCAQMD Regional Clean Air Incentives Market (RECLAIM). The project's air quality impacts were evaluated using the agency-approved dispersion model with agency-processed meteorological data from Long Beach; conservative operating, emission source, and background air quality assumptions; and a modeling receptor grid extending from the project fenceline out to 50 kilometers[1]. This assessment shows that the AEC complies with applicable state and federal air quality requirements. This conclusion was confirmed, after extensive review by the SCAQMD, in the Final Determination of Compliance (FDOC) issued on November 18, 2016 (TN #214527) and the CEC's FSA Part 2 issued on December 8, 2016 (TN #214704). Therefore, AEC will comply with applicable federal, state, and local air quality laws, ordinances, regulations, and standards (LORS) and avoid or minimize potentially significant effects.

A. Affected Environment

Project Location

The proposed AEC will be constructed on an approximately 21-acre site within the larger 71.1-acre property of the existing Alamitos Generating Station (AGS). This site is located in an industrial-zoned area within Long Beach, California. Access to the AEC site will be provided via an existing entrance off North Studebaker Road, just north of the intersection of Westminster Avenue and North Studebaker Road.

Land use in the vicinity of the AEC site is a mix of industrial, commercial, residential, and recreational development. The AEC site is bounded to the north by the existing AGS, Southern California Edison switchyard, and State Route 22 (East 7th Street); to the east by the San Gabriel River and, beyond that, the Los Angeles Department of Water and Power's Haynes Generating Station; to the south by the Plains West Coast Terminals petroleum storage facility and undeveloped property; and to the west by the Los Cerritos channel.

The potential air quality environmental impacts were evaluated based on SCAQMD permitting rules and regulations, which were promulgated to implement applicable federal and state law, because the project will be located within the jurisdictional boundaries of the SCAQMD.

Existing Air Quality

The three ambient air monitoring stations used to characterize existing air quality at the project site were the SCAQMD's South Long Beach, North Long Beach, and Long Beach – Hudson monitoring stations. These stations were chosen based on their proximity to the project site and in consultation with SCAQMD and CEC. For instance, the Long Beach – Hudson monitoring station was determined to be most representative for 1-hour nitrogen dioxide (NO_2), rather than the North Long Beach monitoring station, due to its proximity to the oxides of nitrogen (NO_x)-emitting sources at the Port of Long Beach. All ambient air quality data were based on data published by the California Air Resources Board (ARB), SCAQMD, and U.S. Environmental Protection Agency (EPA). The distance from AEC to each of the monitoring stations and the location of each monitoring station relative to AEC are presented in Table 1.

[1] Additional analyses for visibility and Air Quality Related Values (AQRV) were conducted using VISCREEN and the CALPUFF modeling system, respectively.

TABLE 1
Ambient Air Monitoring Station Locations

Monitoring Station	Pollutants Recorded	Distance from Project Site
South Long Beach	PM_{10}, $PM_{2.5}$	4.6 miles northwest of AEC
North Long Beach	Ozone, NO_2, CO, SO_2, PM_{10}, $PM_{2.5}$	6.4 miles northwest of AEC
Long Beach – Hudson	Ozone, NO_2, CO, SO_2	7.2 miles northwest of AEC

Notes:
CO = carbon monoxide
$PM_{2.5}$ = particulate matter with aerodynamic diameter less than or equal to 2.5 microns
PM_{10} = particulate matter with aerodynamic diameter less than or equal to 10 microns
SO_2 = sulfur dioxide

The EPA and ARB have each established ambient air quality standards (AAQS) to protect public health and welfare. Both federal and state AAQS consist of two parts: maximum concentration of a pollutant and an averaging time over which the concentration is to be measured. Maximum concentrations are based on levels that may have an adverse effect on human health. The averaging times are based on whether the damage caused by the pollutant would occur during exposures to a high concentration for a short time (for example, 1 hour), or during exposures to a relatively lower average concentration over a longer period (8 hours, 24 hours, or 1 month). AAQS have been set for ozone, carbon monoxide (CO), NO_2, sulfur dioxide (SO_2), visibility-reducing particles, sulfates, hydrogen sulfide (H_2S), vinyl chloride, lead, particulate matter with aerodynamic diameter less than or equal to 10 microns (PM_{10}), and particulate matter with aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$).

The EPA and ARB have classified areas in California as attainment or nonattainment with respect to each criteria pollutant, depending on whether the area meets the federal and state AAQS. An area that is designated nonattainment means the area is not meeting the AAQS and is subject to planning requirements to attain the standard. The federal and state attainment statuses for Los Angeles County are presented in Table 2.

TABLE 2
State and Federal Air Quality Designations for Los Angeles County (South Coast Air Basin), California

Pollutant	State Designation	Federal Designation
Ozone	1-hour: Nonattainment (Extreme) 8-hour: Nonattainment	1-hour: N/A 8-hour: Nonattainment (Extreme)
CO	1-hour: Attainment 8-hour: Attainment	1-hour: Attainment 8-hour: Attainment
NO_2	1-hour: Attainment Annual: Attainment	1-hour: Attainment Annual: Attainment
SO_2	1-hour: Attainment 24-hour: Attainment	1-hour: Attainment 24-hour: N/A
PM_{10}	24-hour: Nonattainment Annual: Nonattainment	24-hour: Attainment* Annual: N/A
$PM_{2.5}$	24-hour: N/A Annual: Nonattainment	24-hour: Nonattainment Annual: Nonattainment
Lead	Attainment	Nonattainment
H_2S, Sulfates	Unclassified, Attainment	N/A, N/A

*Effective July 26, 2013, Los Angeles County was reclassified by the EPA from nonattainment to attainment for PM_{10} (78 Federal Register 38223; EPA-R09-OAR-2013-0007-0021).

Notes:
N/A = Not applicable (i.e., no standard)

B. Potential Construction Related Impacts; Avoidance and Minimization Measures

Emissions

Criteria pollutant and GHG emissions will be generated during construction of the project. The construction area includes the approximately 21-acre project site and approximately 18 acres for construction laydown and parking. Construction activities are expected to be completed during a 56-month period, with removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops, and two wastewater retention basins occurring during the first 5 months. Emissions were calculated for construction equipment exhaust, on- and offsite vehicle exhaust, and fugitive dust from vehicle and construction equipment, including grading, bulldozing, and truck loading/dumping. Daily, annual, and total project construction emissions of criteria pollutants were calculated using California Emissions Estimator Model (CalEEMod) methodology, which relies on emission factors developed by the EPA and ARB, and the number and type of construction equipment, number of heavy-duty trucks, and workforce projected for each month of construction. Annual GHG emissions resulting from construction activities were calculated using emission factors from The Climate Registry (TCR) and ARB.

Modeled Impacts

Construction activities are expected to overlap with operation of various units, such as the existing AGS units (prior to planned shutdown) and the AEC combined-cycle turbines and auxiliary boiler (once built). Therefore, the maximum predicted impacts associated with the construction period were based on the combined impacts of the hypothetical worst-case construction-related emissions and emissions of the units operating during that same time period. This resulted in a "conservative" impact analysis. By "conservative", we mean the analysis assumes the worst-case operating conditions, worst-case emission rates, worst-case meteorological conditions, and worst-case background air quality conditions all occur concurrently, even if it is scientifically impossible for such conditions to occur at the same time.

For example, it is assumed that worst-case operating conditions would coincide with worst-case construction emissions. Additionally, the 1-hour NO_2, 1-hour SO_2, and 24-hour $PM_{2.5}$ impacts were based on the worst-case emission rate for their respective averaging periods, though the federal standards associated with these AAQS are based on a statistical averaging over a three year period.

Despite these conservative assumptions, the NO_2, CO, SO_2, $PM_{2.5}$, and federal PM_{10} impacts combined with the background concentrations do not exceed the AAQS. Therefore, AEC construction activities will not cause or contribute to the violation of a standard, and the NO_2, CO, SO_2, $PM_{2.5}$, and federal PM_{10} impacts from construction will be less than significant. For the 24-hour and annual state PM_{10} standards, the background concentrations already exceed the California AAQS without the proposed project. As a result, the predicted impacts plus background also exceed the 24-hour and annual California AAQS and the construction activities associated with the proposed project would further contribute to an existing violation of the standards, absent proposed mitigation.

Mitigation Measures

During the construction phase, emissions from construction equipment will be reduced by using equipment that meet the EPA's Tier 4 final emissions standards, limiting equipment idling to less than 5 minutes, and using electric motors, to the extent feasible. Emissions from onsite vehicles will be reduced by limiting onsite vehicle speeds to 10 miles per hour, or other speeds approved by the CEC's Compliance Project Manager. Best management practices, like watering exposed surfaces, will be implemented to control fugitive dust. An approved Air Quality Construction Mitigation Plan, also referred to as a construction fugitive dust and diesel-fueled engine control plan, will be implemented during the construction period. Included as part of this plan will be the use of an onsite Construction Air

Quality Mitigation Manager, as well as requirements for implementing mitigation measures and reporting measures.

C. Potential Commissioning Related Impacts; Avoidance and Minimization Measures

Emissions

Emissions of criteria pollutants from commissioning of the six natural gas-fired combustion turbines were analyzed using manufacturer data and engineering estimates. Commissioning of the combined-cycle turbines and simple-cycle turbines would not occur during the same year. Nevertheless, it was conservatively assumed, however, that the two combined-cycle turbines would be commissioned simultaneously, as would the four simple-cycle turbines. It was also conservatively assumed that each of these commissioning periods would be completed in less than one year, and total emissions for the commissioning years would be the sum total of the commissioning emissions and the operating emissions, based on the entirety of the operating limits.

Modeled Impacts

The maximum predicted impacts associated with commissioning were based on conservative emission estimates. For example, the 1-hour, 3-hour, and 24-hour impacts for combined-cycle commissioning were based on the assumption that both turbines would be commissioned simultaneously, and the impacts for the simple-cycle commissioning were based on the assumption that all four turbines would be commissioned simultaneously in conjunction with the worst-case operational impacts from the combined-cycle turbines and auxiliary boiler. Annual impacts analyses assumed that the emissions from the respective turbines would be the sum total of the commissioning emissions and operating emissions, based on the entirety of the operating limits.

Despite these conservative assumptions, the NO_2, CO, SO_2, $PM_{2.5}$, and federal PM_{10} commissioning impacts combined with the background concentrations do not exceed the AAQS[2]. Therefore, AEC will not cause or contribute to the violation of a standard, and the NO_2, CO, SO_2, $PM_{2.5}$, and federal PM_{10} impacts from commissioning will be less than significant. For the 24-hour and annual state PM_{10} standards, the background concentrations already exceed the California AAQS without the proposed project. As a result, the predicted commissioning impacts plus background also exceed the 24-hour and annual California AAQS and commissioning of the proposed project would further contribute to an existing violation of the standards, absent proposed mitigation.

Mitigation Measures

The project would be required to provide RECLAIM Trading Credits (RTCs) for NO_x emissions under SCAQMD Rule 2005. The amount of RTCs required were conservatively estimated as the total commissioning emissions plus a full year of operation emissions.

D. Potential Operational Related Impacts; Avoidance and Minimization Measures

Emissions

Emissions of criteria pollutants from the six natural gas-fired combustion turbines and one natural gas-fired auxiliary boiler were estimated using manufacturer data and engineering estimates consistent with

[2] The federal 1-hour NO_2 and SO_2 standards are based on a three year average of the 98th and 99th percentile statistical standards, respectively. The one-time emissions from commissioning would not affect the statistical averaging associated with these standards, and were, therefore, not evaluated further.

BACT[3]. GHG emissions from AEC operation were estimated using the predicted maximum fuel use and EPA emission factors. The proposed NO_x emissions limit for the combined- and simple-cycle turbines will be achieved through the use of dry, low NO_x combustors with selective catalytic reduction (SCR). The proposed NO_x emissions limit for the auxiliary boiler will be achieved through flue gas recirculation with SCR. The proposed CO and VOC emissions limits for the combined- and simple-cycle turbines will be achieved through best combustion design and installation of oxidation catalyst systems. The proposed CO emissions limit for the auxiliary boiler will be achieved through good combustion design. The proposed $PM_{10}/PM_{2.5}$ emissions limit for all three combustion sources will be achieved through best combustion practice, use of pipeline-quality natural gas, and use of inlet air filtration (for the combustion turbines). The proposed SO_2 emissions limit for all three combustion sources will be achieved through the exclusive use of pipeline-quality natural gas with a fuel sulfur content of less than 0.75 grain per 100 dry standard cubic foot (dscf). BACT for GHGs is achieved through the thermal efficiency of the turbines. The proposed emission limits for AEC's combustion turbines and auxiliary boiler, which comply with BACT, are shown in Table 3.

TABLE 3

Proposed Emission Rates for Operation of the AEC

Pollutant	Emission Limit (at 15 percent O_2)		Emission Limit (at 3 percent O_2)
	One GE 7FA.05 [a]	One GE LMS-100PB [b]	One Auxiliary Boiler [c]
NO_x	2.0 ppmv (averaged over 1 hour)	2.5 ppmv (averaged over 1 hour)	0.47 lb/hr
CO	1.5 ppmv (averaged over 1 hour)	2.0 ppmv (averaged over 1 hour)	50 ppmv (averaged over 1 hour)
VOC	2.0 ppmv (averaged over 1 hour)	2.0 ppmv (averaged over 1 hour)	5 ppmv (averaged over 1 hour)
$PM_{10/2.5}$	8.5 lb/hr	6.23 lb/hr	0.51 lb/hr
SO_2	< 0.75 grain of sulfur per 100 dscf of natural gas		0.048 lb/hr
Ammonia	5 ppmv	5 ppmv	5 ppmv
GHG [d]	896 lb CO_2/MWh (Net)	1,293 lb CO_2/MWh (Net)	N/A

[a] Maximum values are for each turbine at an ambient temperature of 28°F and excludes startups and shutdowns.
[b] Maximum values are for each turbine at an ambient temperature of 65.3°F and excludes startups and shutdowns.
[c] Maximum hourly emission rates are based on the maximum hourly heat input.
[d] Includes startups, shutdowns, and non-baseload operation without performance degradation.

Notes:

CO_2 = carbon dioxide
°F = degrees Fahrenheit
GE = General Electric
N/A = Not applicable (i.e., BACT analysis not required)
O_2 = oxygen
ppmv = part(s) per million by volume
lb/hr = pound(s) per hour
lb/MWh = pound(s) per megawatt-hour

Startup and shutdown periods are a normal part of the operation of natural gas-fired power plants. Emissions are greater during startup and shutdown than during steady-state operation. During startup and shutdown, the turbines are not operating at full load, which is where they are most efficient, and the exhaust temperatures are lower during startup and shutdown compared to steady-state operations. Post-combustion emissions control systems, such as the proposed SCR and oxidation catalyst, are designed to function at steady-state exhaust temperatures. Therefore, the SCR and oxidation catalyst systems will be expected to achieve partial abatement for NO_x, CO, and VOC for a portion of the startup and shutdown period.

[3] BACT determinations are made by the SCAQMD. EPA also requires a BACT analysis for GHG emissions as part of the Prevention of Significant Deterioration (PSD) permit application required under the EPA's GHG Tailoring Rule.

Because emissions are greater during startups and shutdowns than during steady-state operation, the BACT limits established for steady-state operations are not technically feasible during these periods. Therefore, SCAQMD has established separate BACT limits for startups and shutdowns. As outlined in the SCAQMD FDOC, combined-cycle turbine cold startups will be limited to 60 minutes, while non-cold startups and shutdowns will be limited to 30 minutes. Simple-cycle turbine startups and shutdowns will be limited to 30 minutes and 13 minutes, respectively. The shutdown cycle for the auxiliary boiler is nearly instantaneous and, therefore, does not need to be developed. The cold, warm, and hot startup times for the auxiliary boiler will be limited to 170 minutes, 85 minutes, and 25 minutes, respectively.

Modeled Impacts

The maximum predicted impacts associated with operation of the AEC were based on conservative emission estimates. For example, the 1-hour impacts were based on the assumption that all six turbines would be in startup and shutdown mode simultaneously and the annual impacts assume all six turbines would operate the maximum permissible hours per year at the worst-case load scenario.

Even with such conservative assumptions, the NO_2, CO, SO_2, $PM_{2.5}$, and federal PM_{10} operational impacts combined with the background concentrations do not exceed the AAQS. Therefore, AEC will not cause or contribute to the violation of a standard, and the NO_2, CO, SO_2, $PM_{2.5}$, and federal PM_{10} impacts from operation will be less than significant. For the 24-hour and annual state PM_{10} standards, the background concentrations already exceed the California AAQS without the proposed project. As a result, the predicted project impacts plus background also exceed the 24-hour and annual California AAQS and operation of the proposed project would further contribute to an existing violation of the standards, absent proposed mitigation.

Additional analyses were conducted to assess the impacts from the AEC on Air Quality Related Values (AQRV) at federal Class I areas and visibility at nearby Class II areas, respectively. The results of these analyses show that the AEC would not adversely affect the AQRVs at nearby Class I areas or visibility at the nearby Class II areas, as confirmed in the SCAQMD FDOC.

Mitigation Measures

As described previously, emissions of criteria pollutants and GHGs would be reduced primarily through compliance with the proposed BACT limits. Additionally, the project would be required to provide emission reduction credits for PM_{10}, SO_2, and VOC emissions and RTCs for NO_x emissions under SCAQMD Rules 1303 and 2005, respectively. Under SCAQMD Rule 1304(a)(2), the AEC is not required to provide SCAQMD Rule 1303 offsets for emissions from the combustion turbines because they are considered a replacement for the existing electric utility steam boilers with no increase in energy output rating. Rather, AEC will surrender offsets consistent with SCAQMD Rule 1303. The AEC's auxiliary boiler and oil water separators are not, however, eligible for the exemption under SCAQMD Rule 1304(a)(2). The Applicant has secured sufficient VOC, PM_{10}, and SO_2 emission reduction credits to offset emissions from the auxiliary boiler and oil water separators, per SCAQMD Rule 1303(b)(2).

E. Summary of Compliance with Applicable LORS

A summary of relevant LORS, as well as a determination of the conformity with applicable LORS, is set forth in the Supplemental Application for Certification (SAFC), Revised Air Quality, Biological Resources, and Public Health Assessment, Tables 5.1-47, 5.1-48, and 5.1-49. (Ex. 1047, p. 5.1-49 to 5.1-66.) AEC complies with the LORS applicable to the project.

F. Summary of the Potential Cumulative Impacts

SCAQMD was contacted and a series of public records requests were filed in order to identify potential cumulative air quality impact sources located within 6 miles of the AEC which had submitted permit

applications but were not yet represented in the ambient background. The resulting cumulative source screening identified 17 sources at three facilities for inclusion in the cumulative impact assessment.

Maximum permitted emission limits for each of the sources were modeled in combination with the worst-case AEC operational scenario. Despite the conservative nature of the analysis, the maximum modeled cumulative NO_2, CO, SO_2, $PM_{2.5}$, and federal PM_{10} concentrations combined with the background concentrations do not exceed the AAQS. Therefore, AEC will not cause or contribute to the violation of a standard, and the NO_2, CO, SO_2, $PM_{2.5}$, and federal PM_{10} impacts from cumulative operation will be less than significant. For the 24-hour and annual state PM_{10} standards, the background concentrations exceed the California AAQS without the proposed project. As a result, the predicted cumulative impacts plus background also exceed the 24-hour and annual California AAQS and operation of the proposed project with cumulative air quality impact sources would further contribute to an existing violation of the standard absent proposed mitigation.

III. Minor Updates to FSA Part 2

A few, minor text updates should be made to reflect information provided and analyses performed since the issuance of the Preliminary Staff Assessment (PSA), as follows:

Page 1-6, Summary of Project Impacts, Mitigation, and LORS Compliance, 1st Paragraph – This paragraph states that additional information is necessary to demonstrate that all applicable LORS would be met, and all impacts would be mitigated to less than significant. This conclusion is from the PSA and should be updated as the information has been provided and analyzed.

Page 4.7-30, Air Quality Table 21 – The controlled CO emission rate for the AEC combined-cycle gas turbines (CCGT) should be updated to 1.5 parts per million by volume, dry basis (ppmvd).

Page 4.7-31, Air Quality Table 24 – The controlled CO emission rate for the AEC simple-cycle gas turbines (SCGT) should be updated to 2 ppmvd.

Page 4.7-35, Air Quality Table 31 – The maximum daily CO emissions for the AEC CCGT should be updated to 1,074.13 pounds per day.

Page 4.7-37, Air Quality Table 32 – The commissioning year oxides of sulfur (SO_X) emissions for the AEC SCGT should be updated to 11,312 pounds per year.

Page 4.7-67, Localized Cumulative Impacts, Last 2 Paragraphs – These paragraphs from the PSA describe the cumulative modeling data collection as not complete and state that the Applicant requested the continued use of the October 22, 2014 source list. A fully updated cumulative source assessment was submitted on August 22, 2016 as Data Response set 6-R4 (TN #212885). This conclusion from the PSA should be updated accordingly.

Page 4.7-91, Rule 1325 – Federal PM2.5 New Source Review Program, 5th Paragraph – The reference to "ACE" in the third sentence should be updated to "AEC".

Pages 4.7-110 through 4.7-115, Air Quality Table 55 – The Applicant recommends the following updates to Air Quality Table 55, for consistency with the full text of the conditions. Note that only the rows with proposed changes have been presented below:

Air Quality Table 55
SCAQMD Permit Conditions with Corresponding Energy Commission Conditions of Certification

SCAQMD Permit Conditions	Energy Commission Condition of Certification	Condition Description
Combined-Cycle Gas Turbine Generators		
A195.9	AQ-A12	CO emission limit of **1.5**~~2.0~~ ppmv @ 15% O_2 averaged over 1-hour. Does not apply during commissioning startup, and shut

SCAQMD Permit Conditions	Energy Commission Condition of Certification	Condition Description
		down periods.
Simple-Cycle Turbines		
E193.5	AQ-E2	The Permit to Construct expires one year from the date of issuance unless extended. **Establishes construction timelines.**
~~E193.6~~	~~AQ-E2~~	~~The Permit to Construct is invalid if construction does not commence within 18 months after the issuance date.~~
~~E193.7~~	~~AQ-E2~~	~~The Permit to Construct is invalid if construction does not commence within 24 months after the issuance date.~~
E73.2	**AQ-E14**	**Requires the BACT/LAER determination to be reviewed prior to the commencement of Phase II construction (simple-cycle).**
Auxiliary Boiler		
E193.5	**AQ-E2**	**The Permit to Construct expires one year from the date of issuance unless extended. Establishes construction timelines.**
E73.2	**AQ-E14**	**Requires the BACT/LAER determination to be reviewed prior to the commencement of Phase II construction (simple-cycle).**
SCR/CO Catalyst for Combined-cycle		
E193.5	**AQ-E2**	**The Permit to Construct expires one year from the date of issuance unless extended. Establishes construction timelines.**
E73.2	**AQ-E14**	**Requires the BACT/LAER determination to be reviewed prior to the commencement of Phase II construction (simple-cycle).**
SCR/CO Catalyst for Simple		
E193.5	**AQ-E2**	**The Permit to Construct expires one year from the date of issuance unless extended. Establishes construction timelines.**
E73.2	**AQ-E14**	**Requires the BACT/LAER determination to be reviewed prior to the commencement of Phase II construction (simple-cycle).**
SCR for the Auxiliary Boiler		
E193.5	**AQ-E2**	**The Permit to Construct expires one year from the date of issuance unless extended. Establishes construction timelines.**
E73.2	**AQ-E14**	**Requires the BACT/LAER determination to be reviewed prior to the commencement of Phase II construction (simple-cycle).**
Ammonia Storage Tanks		
E193.5	**AQ-E2**	**The Permit to Construct expires one year from the date of issuance unless extended. Establishes construction timelines.**
E73.2	**AQ-E14**	**Requires the BACT/LAER determination to be reviewed prior to the commencement of Phase II construction (simple-cycle).**
Oil Water Separator		
E193.5	**AQ-E2**	**The Permit to Construct expires one year from the date of issuance unless extended. Establishes construction timelines.**
E73.2	**AQ-E14**	**Requires the BACT/LAER determination to be reviewed prior to the commencement of Phase II construction (simple-cycle).**

Page 4.7-135, AQ-A17 – Consistent with SCAQMD FDOC A195.16, this condition should be updated to reflect that ammonia emissions from the auxiliary boiler will be averaged over 1 hour, dry basis at 3 percent oxygen.

Page 4.7-148, AQ-D13 – Consistent with SCAQMD FDOC D29.5, this condition should be updated to require SO_X emissions measurements during a source test using a "District-Approved Averaging Time."

Page 4.7-149, AQ-D14 – Consistent with SCAQMD FDOC D29.6, this condition should be updated to only require source testing for CO emissions.

Page 4.7-152, AQ-E2 – Consistent with SCAQMD FDOC E193.5, the first sentence of this condition should be updated as follows:

> The project owner shall **install**~~construct~~ this equipment according to the following requirements:

Page 4.1-179, Global Climate Change and California, 1st Paragraph – The reference to "PRP" in the second sentence should be updated to "AEC".

IV. Proposed Licensing Conditions

The Applicant does not object to the Conditions of Certification for Air Quality (AQ-SC1 through AQ-SC11, AQ-F1 through AQ-F6, AQ-A1 through AQ-A18, AQ-B1, AQ-C1 through AQ-C6, AQ-D1 through AQ-D17, AQ-E1 through AQ-E14, AQ-H1, AQ-I1 through AQ-I3, and AQ-K1 through AQ-K2) set forth in the FSA, which includes permit conditions prepared by SCAQMD.

However, the Applicant does propose a modification (set forth below) to Condition AQ-SC9 to prohibit simultaneous commissioning of the combined-cycle power block and the auxiliary boiler, instead of stipulating an order for commissioning of these units.

AQ-SC9 The project owner shall **not conduct simultaneous fired commissioning of**~~complete~~ the auxiliary boiler ~~commissioning prior to the commissioning of~~ **and** the combined-cycle gas turbines (CCGT-1 and CCGT-2).

Public Health

I. Introduction

A. Name: Elyse Engel, Jerry Salamy, and Stephen O'Kane

B. Qualifications: The panel's qualifications are as noted in their resumes contained in Appendix A.

C. Prior Filings: In addition to the statements herein, this testimony incorporates by reference the following documents submitted in this proceeding:

- Exs. 1500-1508, AES Alamitos Energy, LLC, Supplemental Application for Certification, Alamitos Energy Center, Volumes 1 and 2 (13-AFC-01) (TN #206427-1 through 206427-6 and 206428-1 through 206428-3), October 23, 2015.
- Ex. 1026, CH2M HILL, Alamitos Energy Center (13-AFC-01) Supplemental Application for Certification Air Dispersion Modeling Files and Appendix 5.14A – 2015 EMS Phase I ESA Report (TN #206433), October 23, 2015.
- Ex. 1034, AES Alamitos Energy, LLC, Alamitos Energy Center Air Permit Application Completeness Response (Facility ID 115394) (TN #207265), January 7, 2016.
- Ex. 1041, AES Alamitos Energy, LLC, Alamitos Energy Center (13-AFC-01): Removal of Temporary Secondary Construction Access Road (TN #210632), March 7, 2016.
- Ex. 1044, AES Alamitos Energy, LLC, Alamitos Energy Center Supplemental Application for Certification Revisions (Facility ID 115394) (TN #210805), March 17, 2016.
- Ex. 1047, AES Alamitos Energy, LLC, Alamitos Energy Center Supplemental Application for Certification (13-AFC-01) Revised Air Quality, Biological Resources, and Public Health Assessment (TN #211013), April 12, 2016.
- Ex. 1056, AES Southland Development, LLC, Alamitos Energy Center (13-AFC-01) Preliminary Staff Assessment Initial Comments (TN #212487), July 27, 2016.
- Ex. 1057, AES Alamitos Energy, LLC, Verification of the Public Notice Distribution for the Alamitos Energy Center Project Permit Application (Facility ID# 115394) (TN #212493), July 28, 2016.
- Ex. 1605, CH2M, Alamitos Energy Center Determination of Compliance Revisions (Facility ID 115394) (TN #214373), November 4, 2016.
- Ex. 1606, AES Alamitos Energy, LLC, Verification of the Public Notice Distribution for the Alamitos Energy Center Permit Application (Facility ID 115394) (TN #214636), December 5, 2016.
- Ex. 1607, AES Alamitos Energy, LLC, AES Alamitos, LLC (Facility ID 115394) Draft Facility Permit to Operate and Final Determination of Compliance Comments (TN #214637), December 5, 2016.

All of the facts contained in this testimony (including all referenced documents) are true and correct to the best of our knowledge and belief. To the extent this testimony contains opinions, such opinions reflect our best professional judgment. We make these statements, and render these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

II. Summary of Testimony

We assessed the potential human health risks associated with construction and operation of the AEC. A human health risk assessment (HHRA) was conducted using guidance developed by the Office of

Environmental Health Hazard Assessment (OEHHA), EPA, ARB, and SCAQMD. The HHRA characterized potential public health impacts associated with construction and operation of the AEC in terms of the following three categories: acute or short-term non-cancer health effects, chronic or long-term non-cancer effects, and excess cancer risk. According to SCAQMD Rule 1401, the predicted incremental increase in cancer risk for the entire project must be less than 10 in 1 million and Best Available Control Technology for Toxics (T-BACT) shall be applied to any new source of toxic air contaminants (TAC) where the cancer risk for each individual source is predicted to be greater than 1 in 1 million. Additionally, a cancer burden greater than 0.5 excess cancer cases in areas with an incremental increase greater than 1 in 1 million individuals is considered significant. An acute or chronic hazard index of less than 1 for the entire project is also considered less than significant by SCAQMD. Therefore, we compared the results of the HHRA to the significance criteria established by SCAQMD. Based on the results of the HHRA, predicted public health impacts associated with the project's construction activities and operations are less than significant.

A. Affected Environment

Based on a review of available information, approximately 584,644 residents live within a 6-mile radius of the AEC. Additionally, the following schools (public and private), daycare facilities, convalescent homes, and hospitals were identified as sensitive receptors within a 6-mile radius of the project site, as they are likely to contain members of the population who are more susceptible to the effects of exposure:

- 878 preschool/daycare centers and schools
- 59 nursing homes
- 755 hospitals, clinics, and/or pharmacies
- 8 colleges
- 1 arena
- 2 prisons

The closest sensitive receptor is Rosie the Riveter Charter High School, a privately owned and operated school located on the AGS site, approximately 971 feet from the nearest proposed stack location. The closest sensitive receptor outside the AEC property is Kettering Elementary School, which is approximately 2,297 feet northwest of the nearest proposed stack location. Apart from Rosie the Riveter Charter High School and Kettering Elementary School, there are no other schools within approximately 0.5 mile of the AEC site.

The nearest residents are located approximately 1,165 feet west of the proposed stack locations along E. Mariquita Street and approximately 1,329 feet east of the proposed stack locations along Nassau Drive. The nearest businesses are located approximately 525 feet east of the AEC site.

Within the South Coast Air Basin (SCAB), SCAQMD initiated the Multiple Air Toxics Exposure Study (MATES), which consists of a comprehensive monitoring program, an updated emissions inventory, and a modeling effort to characterize health risks associated with human exposures to ambient concentrations of TAC in the SCAB. The most recent of these studies, MATES IV, found that mobile sources dominate carcinogenic risk in the SCAB by accounting for an estimated 90 percent of the overall carcinogenic risk. Diesel particulate matter (DPM) emissions alone accounted for 68 percent of the carcinogenic risk. The estimated carcinogenic risk from exposure to airborne toxics was 480 in 1 million.[4]

[4] Note that, with implementation of OEHHA's updated methods for estimating carcinogenic risks, the estimated carcinogenic risk from exposure to airborne toxics is closer to 1,000 in 1 million.

B. Potential Construction Related Impacts; Avoidance and Minimization Measures

Equipment and vehicles operating both onsite and offsite during construction of the project will result in TAC emissions, the most predominant of which is DPM. As a result, DPM exhaust emissions from construction activities were calculated using CalEEMod methodology and the number and type of construction equipment, number of heavy-duty trucks, and workforce projected for each month of construction. Emissions were averaged over the 56-month construction period, and spatially distributed in the areas associated with construction of the two proposed power blocks to facilitate the construction HHRA.

Using OEHHA methodology and the DPM exhaust emission rates, the construction HHRA estimated chronic non-cancer and cancer risks at the maximum exposed resident, sensitive receptor, and offsite worker locations. The rolling cancer risks were evaluated for each 56-month period during a 30-year exposure duration (starting with exposure during the third trimester) for residential/sensitive receptor exposure and a 10-year exposure duration (from age 16 to 25) for worker exposure, aligned with the expected construction duration.

Results of the construction HHRA indicate that the excess cancer risks at the maximum exposed resident, sensitive receptor, and offsite worker locations are less than the significance threshold of 10 in 1 million and that the chronic hazard indices at each of these locations are significantly less than 1. Therefore, predicted public health impacts associated with the project's construction activities are less than significant. These less-than-significant impacts would be further reduced with implementation of a construction fugitive dust and diesel-fueled engine control plan.

C. Potential Operational Related Impacts; Avoidance and Minimization Measures

Emissions of TAC from the six natural gas-fired combustion turbines and one natural gas-fired auxiliary boiler were analyzed using emission factors provided by SCAQMD, with the exception of ammonia. The combustion turbine and auxiliary boiler ammonia emission factors were based on operating exhaust ammonia limits of 5 parts per million by volume at 15 percent oxygen and 3 percent oxygen, respectively. Additionally, polycyclic aromatic hydrocarbon emissions from the combustion turbines were conservatively assumed to be controlled up to 50 percent through the use of an oxidation catalyst. The hourly and annual emission rates for the combustion turbines were conservatively estimated based on the maximum heat input rating and expected operating profile.[5] The hourly and annual emission rates for the auxiliary boiler were conservatively estimated based on the maximum hourly and annual heat input rating,[6] respectively.

The pollutant dispersion modeling and risk assessment were conducted following EPA, ARB, and SCAQMD guidance. The dispersion modeling used meteorological data from the North Long Beach meteorological station, as provided by SCAQMD, and a receptor grid extending 6 miles from the project site. Discrete and census block receptors were also included to assess the potential impacts for sensitive land uses and the facility's cancer burden, respectively.

Results of the operation HHRA indicate that acute and chronic hazard indices are significantly less than 1; that the incremental increase in cancer risk from operation of the project at the maximum exposed resident, sensitive receptor, and offsite worker are all less than the significance threshold of 10 in 1 million; and that the cancer risk from each individual source at the maximum exposed resident, sensitive receptor, and offsite worker are all less than the significance threshold of 1 in 1 million. Additionally, the

[5] The combined-cycle combustion turbines are expected to operate 4,100 hours per turbine per year with 500 startups and shutdowns per turbine per year. The simple-cycle combustion turbines are expected to operate 2,000 hours per turbine per year with 500 startups and shutdowns per turbine per year.

[6] The maximum annual heat input rating for the auxiliary boiler includes two cold starts, four warm starts, and four hot starts per month.

cancer burden for the AEC facility is well below the significance threshold of 0.5. Therefore, predicted public health impacts from project operation are less than significant. Although not required, the emission control technologies included in the AEC for all emission sources are considered to be T-BACT.

D. Summary of Compliance with Applicable LORS

A summary of relevant LORS, as well as a determination of the conformity with applicable LORS, is set forth in the SAFC, Revised Air Quality, Biological Resources, and Public Health Assessment, Table 5.9-7. (Ex. 1047, p. 5.9-18 to 5.9-19.) AEC complies with the LORS applicable to the project.

E. Summary of the Potential Cumulative Impacts

The maximum cancer risk and acute and chronic hazard indices for the AEC are all below the SCAQMD's significance thresholds, during both construction and operation. Additionally, the project's stationary source emissions are expected to contribute less than approximately 0.3 percent of the background risk in the vicinity of the project site, based on a comparison to the results of the MATES IV study.[7] The AEC will not result in cumulative public health impacts in combination with other closely related past, present, and reasonably foreseeable future projects.

III. Minor Updates to FSA Part 2

The Applicant has only one update to the Public Health section of the CEC's FSA Part 2, as follows:

Page 4.8-26, 1st Paragraph – The Applicant suggests the second sentence of this paragraph be revised as follows:

> If the demolition of **AGS**~~AEC~~ occurs […]

IV. Proposed Licensing Conditions

No Conditions of Certification are proposed for Public Health.

[7] The MATES IV study indicates that the cumulative background cancer risk from exposure to airborne toxics is approximately 480 in 1 million, or 1,000 in 1 million with implementation of OEHHA's updated methods for estimating cancer risk.

Appendix A
Resumes

AES Alamitos Energy, LLC
690 North Studebaker Road
Long Beach, CA 90803
tel 562 493 7750
fax 562 493 7320

Stephen O'Kane

Vice-President, AES Alamitos Energy, LLC
Manager, Sustainability and Regulatory Compliance

Education

M.S., Atmospheric Science
B.S., Atmospheric Science

Relevant Experience

Mr. O'Kane has over 20 years of experience in energy, environmental assessment and project development, including assignments as project manager for regulatory applications for the development of new thermal generation projects and applications for certification (AFC) before the California Energy Commission (CEC). In addition to managing, directing or contributing to the licensing and permitting process for development projects he has also prepared environmental assessments, air quality analyses and permit applications, prepared project feasibility studies, managed facility compliance systems, and prepared sustainability plans for projects and organizations in the energy industry.

Representative Projects

AES Southland Development:

Huntington Beach Energy Project
AES Alamitos Energy Center
AES Redondo Beach Energy Project

Vice-President of Development, Permitting Manager and Applicant to the California Energy Commission (CEC) for the redevelopment of the AES Southland thermal generation fleet. As the Permit and Sustainability Manager, provided design criteria, reviewed engineering proposals and design, prepared analytical assessments and managed the preparation of the Applications for Certification (AFC) to the CEC for three electric utility generating stations in the western Los Angeles local reliability area.

AES Alamitos Energy Storage

Vice-President of Development, Permitting Manager and Applicant to the City of Long Beach for the development of a 300 MW battery energy storage system at the AES Alamitos Generating Station. As the Permit and Sustainability Manager, provided design criteria, reviewed engineering proposals and design, prepared analytical assessments and managed the preparation of the Applications for a Conditional Use Permit, Local Coastal Development Permit, Standards Variance and Mitigated Negative Declaration to the City of Long Beach for a 300 MW battery energy storage system.

AESWapiti, Tumbler Ridge, BC
Project Manager for the Application for Project Approval to the BC Environmental Assessment Office for the Wapiti Power Development Project near Tumbler Ridge, BC. Major project components were a 184 MW biomass and coal fired circulating fluidized bed boiler and power plant, 35 km of 230kV transmission line and a 750,000 tonne per year surface coal mine.

AES Gener, Chile
Engineering specialist for the assessment and retrofit of the AES Nuevo Renca combined cycle power plant and the Ventanas thermal generating station.

AES Corporation: Highgrove Energy, California
Edison Mission Energy: Walnut Creek Energy Project, California
Calpine: Los Esteros Critical Energy Facility, California
PacifiCorp: Hunter Plant, Utah
Shell International: Pearl GTL, Doha, Qatar
Served as the Project Manager, Deputy Project Manager or Task Manager for numerous energy development applications to the California Energy Commission, US Environmental Protection Agency, Qatar Supreme Council of the Environment or local permitting agencies. Project Manager of record or primary author of individual sections of application submittals and environmental assessments. Lead or participant on community relations teams, gave testimony for regulating agencies and wrote public announcements and newsletters.

Island Cogeneration Project, B.C. Canada
Preparation of an "Application for a Project Approval Certificate" for the BC Environmental Assessment Office for the 275 MW cogeneration project at the Elk Falls pulp mill in Campbell River, BC. Project Manager and air quality technical lead for the environmental analysis of the proposed power plant, cooling tower, and adjacent pulp mill. Conducted stakeholder consultation with relevant regulatory agencies, community groups and NGOs and author of the environmental assessment section of the project report.

Los Angeles Department of Water and Power – "Owens Valley PM10 Planning Area, Demonstration of Attainment, State Implementation Plan, 2003 Revision"
Project Manager for the state implementation plan (SIP) revision prepared in conjunction with the Great Basin Unified Air Pollution Control District (GBUAPCD) to meet federal requirements in the Clean Air Act Amendments of 1990. The revised SIP included an analysis of the particulate matter air pollution problem in the Owens Valley and provided a control strategy to reduce emissions from the dry Owens Lake bed.

BP Energy, Burlington Resources, Talisman Energy, North Star Energy, Canadian Natural Resources Ltd., British Columbia and Alberta, Canada.
Project Manager and developer of an assessment and test protocol for well test flares in conjunction with the Oil and Gas Commission, the BC Ministry of Environment and a number of gas producers. Completed numerous pre- and post-flare air quality impact assessments of sulphur dioxide emissions from sour gas well tests and conducted onsite monitoring and forecasting.

US Air Force, Onizuka Air Force Station, Sunnyvale, California
Project Manager and lead technical specialist for the an application for a Bay Area Air Quality Management District, Permit to Operate for the Onizuka Air Force Station power plant.

Jerry Salamy

Air Quality Permitting Specialist

Education

B.A., Chemistry

Relevant Experience

Mr. Salamy has more than 25 years of experience, including assignments as project manager for applications for certification (AFC) before the California Energy Commission (CEC). He has also prepared air quality permit applications, prepared project feasibility studies, assessed industrial facilities compliance with state and federal air pollution rules and regulations, and assisted power plant clients with compliance-related issues.

Representative Projects and Dates of Involvement

Project Manager and Air Quality Lead; Application for Certification; Huntington Beach Energy Project; AES Southland Development LLC; Huntington Beach, CA. Managed the preparation of the air quality section of an AFC for a 1,185-MW combined cycle repower of the existing Huntington Beach Generating Station located in Huntington Beach, CA. The project required the preparation of numerous other studies and a Prevention of Significant Deterioration (PSD) permit application submitted to the South Coast Air Quality Management District. Air permitting required extensive document preparation to demonstrate the project was employing the Best Available Control Technology to control greenhouse gas emissions.

Project Manager and Air Quality Lead; Application for Certification; Alamitos Energy Center; AES Southland Development LLC; Long Beach, CA. Managed the preparation of the air quality section of an AFC for a 1,950-MW combined cycle repower of the existing Alamitos Beach Generating Station located in Long Beach, CA. The project required the preparation of numerous other studies and a Prevention of Significant Deterioration (PSD) permit application submitted to the South Coast Air Quality Management District. Air permitting required extensive document preparation to demonstrate the project was employing the Best Available Control Technology to control greenhouse gas emissions. The project also required the submittal of an Air Quality Related Values analysis to the Federal Land Manager (National Forest Service) to assess project impacts on Class I area, consistent with the PSD program requirements.

Project Manager and Air Quality Lead; Application for Certification; Redondo Beach Energy Project; AES Southland Development LLC; Redondo Beach, CA. Managed the preparation of the air quality section of an AFC for a 546-MW combined cycle repower of the existing Redondo Beach Generating Station located in Redondo Beach, CA. The project required the preparation of numerous other studies and a Prevention of Significant Deterioration (PSD) permit application submitted to the South Coast Air Quality Management District. Air permitting required extensive document preparation to demonstrate the project was employing the Best Available Control Technology to control greenhouse gas emissions. The project is actively opposed by several public groups and the City of Redondo Beach.

Deputy Project Manager and Air Quality Lead; Application for Certification; Mariposa Energy Project; Diamond Generating Corporation; Tracy, CA. Managed the preparation of the air quality section of an AFC for a 200-MW peaking power plant in near Tracy, CA. The project required the preparation of numerous other studies and a permit application submitted to the Bay Area Air Quality Management District. Air permitting required extensive document preparation to demonstrate the project was employing the Best Available Control Technology to control air emissions. The project was highly contested with a significant level of public involvement.

Air Quality Lead; Application for Certification; Rice Solar Energy Project; SolarReserve. Managed the preparation of the air quality section of an AFC for a 150-MW concentrating solar power plant in San Bernardino County, CA. The project required the preparation of numerous other studies and a permit application submitted to the Mojave Desert Air Quality Management District. Air permitting required extensive document preparation to define air emissions associated with the thermal energy storage system due to its unique characteristics.

Project Manager; Application for Certification; East Altamont Energy Center, Calpine Corp.; Tracy. Managed the preparation of the East Altamont Energy Center AFC for a 1,100-MW power plant in Tracy. Mr. Salamy also prepared the alternative site and generating technologies, ammonia risk assessments, and provided general licensing support.

Project Manager; Application for Certification; Los Esteros Critical Energy Facility; Calpine C*Power; San Jose, CA. Managed the preparation of the AFC for a 180-MW power plant in San Jose. The project required the preparation of numerous other studies/documents to satisfy the CEC staff request. These studies/documents included the preparation of a general plan amendment and planned development zoning applications, archaeological and paleontological survey reports, and biological resource protection permits. Mr. Salamy also managed the development and implementation of biological, cultural, and paleontological resource monitoring programs; risk management plan; traffic and transportation management plan; waste reduction program; and an electromagnetic force evaluation for project construction.

Deputy Project Manager; Application for Certification; Metcalf Energy Center; Calpine Corp.; San Jose, CA. Assisted in the management of the preparation of the Metcalf Energy Center AFC. Mr. Salamy was responsible for the development and tracking of data response submittals requested by the CEC. Mr. Salamy also authored data responses for hazardous materials management.

Air Quality Lead; Application for Certification; Sutter Power Plant; Calpine Corp.; Yuba City, CA. Managed the preparation of the air quality section of the Sutter Power Plant AFC. The air quality analysis required the preparation of an environmental setting for the project site, a criteria and toxic pollutant emission inventory, a Best Available Control Technology analysis, and air dispersion modeling. These analyses were used to support the preparation of a Prevention of Significant Deterioration and New Source Review permit applications. These applications were submitted to the U.S. EPA Region IX office and the Feather River Air Quality Management District for the issuance of a construction permits. The scope of work also required the identification of emission reduction credits (ERCs) to support the New Source Review permitting process. Mr. Salamy was instrumental in locating and negotiating for the purchase of the ERCs necessary for the siting of the Sutter Power Plant.

Project Manager; Air Quality Audits, SMUD. Managed air quality audits for four power plants in Northern California. He conducted air quality audits of the Central Valley Finance Authority's Carson Energy Facility and McClellan Gas Turbine Facility and oversaw air quality audits at the Sacramento Cogeneration Authority – SCA Cogen II and Cogen III. Mr. Salamy's responsibilities included managing the development of the pre-audit checklist and field interview forms; conducting kick-off, pre-audit, and close-out audit meetings; conducting field interviews and audits; summarizing and presenting findings; and preparing the final audit reports.

Project Manager and Air Quality Lead; Apex Generating Station Licensing; Mirant Inc.; Las Vegas, NV. Managed the licensing of Mirant's 1,100-megawatt Apex Generating Station. Mr. Salamy prepared a Prevention of Significant Deterioration Pre-Construction Permit Application for the project, as well as the preparation of a National Environmental Policy Act Environmental Assessment to support the siting of the 500-kilovolt transmission line.

Elyse Joy Engel

Chemical Process Engineer 4

Education

B.S., Chemical Engineering, Massachusetts Institute of Technology (MIT), 2007

Professional Registrations

Engineer in Training, California

Distinguishing Qualifications

- Works efficiently with an eye for perfection
- Succeeds in leadership roles with a large degree of responsibility; collegiate roles include Executive Vice President of a sorority and President of MIT's Habitat for Humanity chapter
- Works well in a team environment, respecting the ideas of others while being vocal about alternatives

Relevant Experience

Ms. Engel is a chemical process engineer in the Environment & Nuclear Services Business Group, specializing in air quality. Ms. Engel works from CH2M's San Jose, California office. She is experienced in air quality compliance, including preparing greenhouse gas (GHG) emissions inventories, construction and operational air emissions estimates in support of California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) evaluations, air dispersion modeling, human health risk assessments, and risk management plans. She has more than 8 years of engineering experience and has taken graduate-level courses in Chemical Engineering and Air Pollution Chemistry.

Representative Projects and Dates of Involvement

Project Manager; Compliance Assistance; City of Vernon; 2008 to Present; Vernon, California

- Collected site data and prepared a GHG emissions inventory for the City of Vernon, including emissions from fleet vehicles, city offices and buildings, the power plant, and transmission lines. Performed emissions calculations according to the California Climate Action Registry (CCAR), The Climate Registry (TCR), the California Air Resources Board (ARB), and the U.S. Environmental Protection Agency (EPA) protocols. Provided verification assistance, which included site visits and communication with a third party verifier.
- Established a compliance calendar to capture the City of Vernon's air quality, industrial wastewater and storm water, hazardous materials, and GHG reporting requirements under various agencies. Managed a team, including CH2M and City of Vernon personnel, to implement the compliance calendar.
- Coordinated preparation and submittal of various compliance reports, including Quarterly Certification of Emissions Reports and Annual Permit Emissions Program Reports for the South Coast Air Quality Management District (SCAQMD).
- Prepared a Title V Permit Renewal Application for the City of Vernon, which was submitted to the SCAQMD.
- Researched developments to the ARB's Cap-and-Trade Program for relevance to the City of Vernon and provided assistance in preparing for the first allowance auction, held on November 14, 2012.

Project Manager; Bay Area Clean Water Agencies (BACWA) Air Issues and Regulations (AIR) Committee; 2013 to 2016; Oakland, California

- Managed regulatory services to BACWA's AIR Committee, which includes several agencies which own and operate publicly-owned treatment works (POTWs) in the San Francisco Bay Area.
- Conducted bi-monthly meetings to inform member agencies of local, state, and federal air quality and climate change regulations and issues that may impact POTWs.
- Advocated on behalf of member agencies to the ARB, Bay Area Air Quality Management District (BAAQMD), and other regulatory agencies. Prepared a comment letter on behalf of member agencies to encourage the BAAQMD to consider cross-media regulatory issues in their proposed Climate Protection Strategy (e.g., nutrient removal's impact to GHG emissions and air toxics regulations that discourage the use of renewable biogas).

Project Manager; GHG Emissions Inventory; Sempra Generation; 2008 to Present; Arizona, California, and Mexico

- Collected site data and prepared GHG emissions inventories for 3 power generation facilities in western North America. Performed emissions calculations according to the CCAR, ARB, and TCR protocols. Provided verification assistance for two facilities, which included site visits and communication with a third party verifier.
- Managed other team members who assisted with this effort and interfaced with the client regarding project delivery.

Project Manager; Risk Management Plan Updates; Various Clients; 2010 to Present; California and Arizona

- Participated in Process Hazard Analyses or Hazard Reviews for chlorine and ammonia processes used for wastewater treatment and/or emissions control.
- Audited facilities' Risk Management Programs and Process Safety Management Programs to ensure compliance with the California Accidental Release Prevention Program and Occupational Safety and Health Administration regulations.
- Assisted facilities with the creation and/or update of Risk Management Programs and documents, including performing offsite consequence analyses.

Task Lead; Application for Certification (AFC) Preparation; AES; 2012 to Present; California

- Estimated short- and long-term emissions associated with repowering a natural gas-fired power plant using CalEEMod, an air dispersion model, and emission factors from EMFAC. Estimated air quality impacts associated with short- and long-term emissions using AERMOD, an air dispersion model. Revised results quickly to incorporate new data or methodology to meet an accelerated schedule.
- Drafted and revised the Air Quality and Public Health sections of the AFC and the accompanying appendices, including evaluations of applicable federal, state, and local air and GHG regulations.
- Interfaced with client and regulatory agencies during this effort to resolve disagreements surrounding appropriate mitigation, potentially significant impacts, methodology, etc.
- Led team members to complete tasks for multiple sites simultaneously with very truncated delivery schedules.

Task Lead; GHG Emissions Inventory; Confidential Client; 2008 to 2011; Nationwide

- In 2008 and 2009, prepared GHG emissions inventories for California-operated petroleum refineries of a major petroleum industry client. Performed emission calculations according to the CCAR and ARB protocols. Provided verification assistance for one facility, which included a site visit and communication with a third party verifier.
- In 2010 and 2011, prepared a template by which each refinery belonging to this nationwide company could estimate and report GHG emissions according to the EPA's Mandatory Reporting Regulation, documented in 40 Code of Federal Regulations Part 98. Hosted two training sessions, guiding refinery personnel through the process of entering emissions data electronically for EPA reporting.

Task Lead; CEQA and NEPA Evaluations; California Department of Transportation; 2014 to Present; California

- Estimated short- and long-term emissions associated with modification of existing interstates and roadways within California using CalEEMod and emission factors from EMFAC and/or CT-EMFAC.
- Completed regional-level and project-level conformity analyses, including qualitative evaluations of mobile source air toxics and particulate matter hot-spots.
- Performed carbon monoxide hot-spots analyses using the CALINE4 air dispersion model and emission factors from EMFAC.
- Drafted and revised Environmental Impact Statements and the accompanying technical reports, including evaluations of applicable federal, state, and local air and GHG regulations.

Team Member; CEQA and NEPA Evaluations; Various Clients; 2011 to Present; California

- Estimated short- and long-term emissions associated with various remediation and new construction projects using CalEEMod and emission factors from EMFAC. Revised model runs quickly to incorporate new data or methodology to meet an accelerated schedule. Interfaced with client and contractors during this effort to discuss proposed construction schedules and equipment lists.
- Drafted and revised Environmental Impact Statements and the accompanying technical appendices, including evaluations of applicable federal, state, and local air and GHG regulations. Completed a general conformity analysis for several of these projects.

Team Member; California High Speed Train; Federal Rail Authority; 2010 to 2014; California

- Estimated construction and operational emissions associated with the High Speed Train using URBEMIS2007, an air dispersion model, and emission factors from EMFAC. Updated model runs frequently and quickly to incorporate new data or methodology to meet an accelerated schedule. Interfaced with external CH2M project teams during this effort to discuss methodology and proposed construction schedules.
- Helped draft and review the Environmental Impact Report and accompanying Technical Report for the Merced to Fresno segment of the High Speed Train, which were both up to 200 pages in size. Completed a general conformity analysis for this project.
- Performed a microscale carbon monoxide analysis using EMFAC emission factors and CALINE4 to estimate emissions from a parking structure. Reviewed these analyses using the CAL3QHC air dispersion model.

Team Member; Air Dispersion Modeling; Various Clients; 2008 to Present

- Performed air quality impact analysis using the Open Burn/Open Detonation (OB/OD) air dispersion model. Developed testing scenarios and technical options to adequately characterize the disposal of spent propellants, as well as the testing of rocket motors.
- Performed air quality impact analyses using AERMOD for a variety of power plant facilities. Evaluated results and provided peer review.
- Performed air quality impact analyses using the CALPUFF air dispersion model to evaluate the potential migration of chemical constituents from a variety of sources, including the testing of rocket motors, electricity generating units, and demolition.
- Performed human health risk assessments using the ARB HARP model. Identified air toxics, conducted emission calculations, and performed scenario modeling to determine the potential cancer, chronic, and acute risks to surrounding workers and residents.
- Prepared modeling protocols, to document modeling parameters and methodology, and modeling reports, to present the modeling results and conclusions.

Experience Prior to CH2M

Technical Intern; Development of Decontamination Wipes; Department of Defense and Department of Energy; 2006; Woburn, Massachusetts

- Supported the development of self-detoxifying decontamination wipes for military purposes by preparing formulations, running experiments, and analyzing samples using gas chromatography. Research focused on understanding room temperature oxidation of mustard gas, catalyzed by vanadium tri-isopropoxide oxide.

Technical Intern; Methods for Reduction of Titanium Oxide for Titanium Metals Corp.; Defense Advanced Research Projects Agency; 2005; Henderson, Nevada

- Conducted experiments studying electrolytic reduction of titanium dioxide into pure titanium metal. Examined variables affecting electrolytic reduction of metal oxides. Achievements include the successful scale-up of a 50-pound electrolytic cell to a 500-pound electrolytic cell for reduction.

Honors and Awards (CAN employees: Honours and Awards)

Received written, positive feedback from the City of Vernon regarding successful management of and commitment to quality for the Compliance Assistance Project.

Specialized Computer Skills

- AERMOD, modeling tool for air dispersion
- CALPUFF, modeling tool for air dispersion
- OBODM, modeling tool for air dispersion resulting from OB/OD activities
- HARP, modeling tool for health risk analyses
- URBEMIS2007, modeling tool for air dispersion resulting from construction activities
- CalEEMod, modeling tool for air dispersion resulting from construction activities
- SAC Roadway Construction Emissions Model, modeling tool for air dispersion resulting from linear construction activities

- CAL3QHC, modeling tool for air dispersion resulting from vehicle movement
- CALINE4, modeling tool for air dispersion resulting from vehicle movement
- EMFAC, tool used to develop emission factors for on-road vehicles
- ALOHA, modeling tool for air dispersion for performing offsite consequence analyses
- BASTE, modeling tool for fugitive emissions from wastewater treatment processes
- MATLAB (R2007b), computing language for algorithm development, data visualization, data analysis, and numeric computation
- ABACUSS II, modeling tool and simulator for chemical processes
- AspenPlus, modeling tool for chemical process design, optimization, and performance

Professional Development

Graduate coursework completed in Chemical Engineering, University of Texas at Austin; 2007. Topics included Advanced Analysis for Chemical Engineers, Fluid Flow and Heat Transfer, and Air Pollution Chemistry.

Languages

Spanish (travelers' basics)

Additional Training

40-hour Hazardous Waste, January 2016

Supplemental Information

Years Experience Prior to CH2M: 2
CH2M Hire Date: February 18, 2008

Employment History

Entropic Systems, Inc., Technical Intern, 2006, detailed experience is described in the above section titled Experience Prior to CH2M.

Titanium Metals Corp., Technical Intern, 2005, detailed experience is described in the above section titled Experience Prior to CH2M.

Benjamin J. Beattie

Associate Engineer/Air Quality Specialist

Education

B.S., Chemical Engineering, Georgia Institute of Technology, (December, 2004)

Distinguished Qualifications

- Proficient in running EPA dispersion models: CAL3QHC, CALINE4, AERMOD, CALPUFF
- Proficient in running EPA-approved emission factor models: MOVES, MOBILE6, EMFAC, NONROAD, URBEMIS
- Experienced with Database management programming; MS Excel, MS Access, MySQL

Relevant Experience

As an associate engineer with CH2M, Mr. Beattie is an air quality specialist trained in dispersion modeling, NEPA/CEQA, and transportation conformity.

Representative Projects

PM/Lead Technical Reviewer, Chevron Products Company, Various US Locations, 2006-current. As the project manager and lead technical consultant, Mr. Beattie has lead the effort to file reports for the EPA Toxic Release Inventory for up to 25 fuel terminals annually. Tasks associated with this project include characterization and speciation of toxic wastes, calculation of air emissions using AP-42 emissions factors and the EPA TANKS model, calculation of toxic releases to streams, remediation efforts, coordination of a large project team, and communication with the client project manager and client terminal personnel.

Associate Engineer, Multiple Energy Clients, 2008-2016. As the modeling lead and project task member for multiple power plant projects, Mr. Beattie has been tasked with preparing air quality and public health sections for the CEC and local air agency permitting processes. Tasks associated with these project include characterization and calculation of emissions for construction equipment using the California ARB EMFAC, OFFROAD, URBEMIS, and CalEEMod models, calculation of emissions from gas-fired boilers, gas-fired combustion turbines, and diesel-fueled ancillary equipment, development of meteorological datasets using AERMET, evaluation of air quality impacts using ISC, AERMOD, and SCREEN3, evaluation of human health risk using the ARB HARP model, and preparation of report sections and figures.

Associate Engineer, Federal Transit Authority, Various US Locations, 2011-2012. As the task lead, Mr. Beattie was in charge of developing a methodology for the screening of potential transit projects against the EPA PM10 and PM2.5 Hot Spot rules. Other tasks associated with this project included developing transit bus emission profiles using the EPA MOVES model and California EMFAC model and developing AERMET meteorological datasets for ten representative transit center locations across the country.

Associate Engineer, Multiple BART Clients, 2011-2012. As a project team member for multiple clients, Mr. Beattie was tasked with performing modeling analyses in support of the EPA Best Available Retrofit Technology rules for coal-fired boilers in Utah and Wyoming. Tasks associated with this project include development of a CALMET meteorological dataset, modeling of NOx, SO2, and speciated particulates for various retrofit options using the CALPUFF modeling system, and preparation of technical reports Results from the modeling were then post processed to determine the resulting change in visual range at nearby Class I areas.

Process Engineer, BP Cherry Point Refinery, Washington, 2008. Process engineer tasked with control valve sizing and verification for 2009 refinery hydrocracker and reformer turnaround.

Professional Development

ABS Consulting, US Environmental Laws and Regulations Course, Hilton Head, South Carolina, 2005

OSHA 10-hour Construction Safety Awareness Training and Site Safety Coordinator Certification, September 2006

MOVES (Motor Vehicle Emission Simulator) 2010a Workshop Completion Certification, April 2011

EPA/FHWA Quantitative PM Hot-spot Analyses Workshop Certification, September 2011.

Employment History

2006-Present, Associate Engineer, CH2M HILL, Sacramento, California
2005-2006, Environmental Engineer, Georgia Pacific Corp., Atlanta, Georgia

Appendix B
Declarations

DECLARATION OF
STEPHEN O'KANE

I, Stephen O'Kane, declare as follows:

1. I am presently employed by AES Alamitos Energy, LLC as a Vice President.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The testimony on Project Description, Compliance, Alternatives, Air Quality, and Public Health for the Alamitos Energy Center project (13-AFC-01) was prepared either by me or under my supervision, and is based on my independent analysis, data from reliable sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed herein.

5. I am personally familiar with the facts and conclusions presented in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 10/14/16

Signed: S O'Kane

DECLARATION OF
Jerry Salamy

I, Jerry Salamy, declare as follows:

1. I am presently employed by CH2M HILL as Principal Project Manager.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The testimony on Project Description, Air Quality, Compliance, Hazardous Materials Handling, Public Health, Waste Management, Worker Health and Safety, and Alternatives for the Alamitos Energy Center project (13-AFC-01) was prepared either by me or under my supervision, and is based on my independent analysis, data from reliable sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed herein.

5. I am personally familiar with the facts and conclusions presented in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 10/13/16

Signed: 

DECLARATION OF
Elyse Engel

I, Elyse Engel, declare as follows:

1. I am presently employed by CH2M as a Chemical Process Engineer/Air Quality Specialist.

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The testimony on Air Quality and Public Health for the Alamitos Energy Center project (13-AFC-01) was prepared either by me or under my supervision, and is based on my independent analysis, data from reliable sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed herein.

5. I am personally familiar with the facts and conclusions presented in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 12/8/16

Signed: Elyse Jay Engel

DECLARATION OF
Benjamin Beattie

I, Benjamin Beattie, declare as follows:

1. I am presently employed by CH2M as a Chemical Process Engineer/Air Quality Specialist

2. A copy of my professional qualifications and experience are attached hereto and incorporated herein by reference.

3. The testimony on Air Quality for the Alamitos Energy Center project (13-AFC-01) was prepared either by me or under my supervision, and is based on my independent analysis, data from reliable sources, and my professional experience and knowledge.

4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed herein.

5. I am personally familiar with the facts and conclusions presented in the testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 12/8/16

Signed: