

Responses to Public Comments

**Federal “Prevention of
Significant Deterioration” Permit**

Russell City Energy Center

Bay Area Air Quality Management District
Application Number 15487

February 2010

Responses to Public Comments on
Draft Federal Prevention of Significant Deterioration Permit
Russell City Energy Center

The Bay Area Air Quality Management District ("Air District") is issuing a Federal Prevention of Significant Deterioration ("PSD") permit to the Russell City Energy Company, LLC, for construction and operation of the Russell City Energy Center. The Air District is issuing this Federal PSD Permit in accordance with the requirements of 40 C.F.R. Section 52.21 and 40 C.F.R. Part 124, and under authority to issue PSD Permits delegated by EPA Region IX. This document sets forth the Air District's responses to the public comments it received on this permit.

The Federal PSD Permit that the Air District is issuing for this facility is based on the analysis and conclusions set forth in the Air District's December 8, 2008, Statement of Basis and August 3, 2009, Additional Statement of Basis, as well as on the Responses to Comments set forth in this document. These documents, as well as all of the supporting documentation on which the Air District's permitting analysis is based, are available for public review at Air District headquarters at 939 Ellis Street, San Francisco, CA, 94117. The most significant documents are also available electronically on the Air District's website at www.baaqmd.gov.

Members of the public who participated in this permitting action and who are dissatisfied with the District's permitting action may appeal the permit to the Environmental Appeals Board ("EAB") pursuant to the appeal provisions of 40 C.F.R. Section 124.19. Any such members of the public must file any appeal no later than March 22, 2010. Permit appeals must be actually received and filed with the Environmental Appeals Board no later than March 22, 2010, to be considered timely. More information regarding the EAB appeals process is available from the EAB at the following address:

U.S. Environmental Protection Agency
Clerk of the Board, Environmental Appeals Board (MC 1103B)
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460-0001
www.epa.gov/eab/

Notice of this permitting action will be served by U.S. mail and/or e-mail on the permit applicant, all persons who submitted written or oral comments during the public comment periods for this permit, and other interested persons and entities. Although not required for PSD permits, notice will also be provided by publication in at least one newspaper of general circulation in the area where the project is located, in keeping with the Air District's practice under state-law rules for issuing Authority to Construct permits.

Dated: February 3, 2010

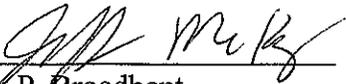

Jack P. Broadbent
Executive Officer/Air Pollution Control Officer

TABLE OF CONTENTS

I. INTRODUCTION AND SUMMARY OF CHANGES MADE IN FINAL PERMIT..... 1

II. ISSUES REGARDING THE POWER GENERATION EQUIPMENT PROPOSED FOR THIS FACILITY 4

Comment II.1. – Currentness of Combustion Turbine Technology: 4

Comment II.2. – Use of Duct Burners to Generate Additional Power: 7

Comment II.3. – Design of Facility For Intermediate-To-Baseload Service:..... 13

Comment II.4. – Sources of Emissions Estimates: 13

Comment II.5. – Review of Individual System Components: 15

Comment II.6. – Specific Turbine Details: 15

Comment II.7. – Technology-Forcing BACT Requirements: 16

III. GREENHOUSE GAS ISSUES 18

A. Applicability of PSD Permit Requirements to Greenhouse Gas Emissions 18

Comment III.A.1. – Applicability of Federal PSD Program to Greenhouse Gas Emissions: 18

Comment III.A.2. – Regulation of Greenhouse Gas Emissions Under Other Authorities: 19

Comment III.A.3. – Regulation of Greenhouse Gases as a Contributor to Criteria Pollutant Formation:..... 20

B. Greenhouse Gas BACT Technology Analysis For Combined-Cycle Power Generation Trains..... 21

Comment III.B.1. – Feasible Control Technologies for Greenhouse Gas Emissions: 21

Comment III.B.2. – Evaluation of Non-Fossil-Fuel Fired Electrical Generation Alternatives: ... 25

C. Expression of Greenhouse Gas BACT Emissions Limits In Permit Conditions 32

Comment III.C.1. – Evaluation of BACT Emissions Performance Standard for Combined-Cycle Combustion Turbines:..... 32

D. Greenhouse Gas BACT Analysis for Other Equipment 43

Comment III.D.1. – Greenhouse Gas Emissions from Emergency Firepump Diesel Engine and Circuit Breakers:..... 43

E. Other Greenhouse Gas Issues 49

Comment III.E.1. – Greenhouse Gas Emissions During Turbine Startup and Shutdown: 49

Comment III.E.2. – BACT for Other Species of Greenhouse Gases:..... 50

Comment III.E.3. – Air District Greenhouse Gas Emissions Fees: 50

Comment III.E.4. – Basing Greenhouse Gas Emissions on Natural Gas Consumption:..... 51

IV. NO₂ ISSUES 52

A. Evaluation of “EMx” As An Alternative Control Technology 52

Comment IV.A.1. – Currentness of Information Used In Comparing Energy and Economic Impacts of SCR vs. EMx Control Technologies:..... 52

Comment IV.A.2. – Potential For Accidental Ammonia Spills/Releases:	54
Comment IV.A.3. – Potential Ancillary Impacts From “Ammonia Slip” Emissions:	57
B. Consideration of Substituting Urea Instead of Aqueous Ammonia As Source of Injected Ammonia For SCR System.....	60
Comment IV.B.1. – Use of Urea Instead of Ammonia in SCR System:	60
C. NO₂ BACT Emissions Limits.....	63
Comment IV.C.1. – Hourly NO ₂ Limit:	63
Comment IV.C.2. – Annual NO ₂ Limit:	64
Comment IV.C.3. – Carlsbad Energy Center NO ₂ Limit:	64
D. NO_x as a Precursor To Secondary PM_{2.5} Formation	65
Issue IV.D.1. – BACT for NO _x as a Precursor to Secondary Particulate Matter Formation:	65
V. CARBON MONOXIDE ISSUES	66
Comment V.1. – Determination of BACT Limit for Carbon Monoxide:	66
Comment V.2. – Collateral Environmental Impacts Comparison Between Different Types of Oxidation Catalysts:.....	75
Comment V.3. – Carbon Monoxide Limits for Startups:	75
VI. PARTICULATE MATTER ISSUES	76
Comment VI.1. – Applicability of PSD Permitting Requirements for Fine Particulate Matter (PM _{2.5}):.....	76
Comment VI.2. – Regulating Ammonia Slip as a Precursor to the Formation of Secondary Particulate Matter:.....	79
Comment VI.3. – Particulate Matter BACT Limit For Gas Turbines/HRSGs:.....	83
Comment VI.4. – Particulate Matter BACT Analysis for Cooling Tower:.....	86
Comment VI.5. – Alameda County Public Health Department Letter in CEC Eastshore Proceeding:	89
Late Communication Regarding Particulate Matter Test Methods:	90
VII. SO₂ ISSUES.....	91
Comment VII.1 – Carlsbad SO ₂ Emissions Limits:.....	91
VIII. STARTUP AND SHUTDOWN ISSUES.....	92
A. Applicability Of BACT Requirement To Startups And Shutdowns.....	92
Comment VIII.A.1. – Applicability of BACT to Startups and Shutdowns:	92
Comment VIII.A.2. – Inclusion of Startup Limits as Enforceable Permit Conditions:	93
B. BACT Limits For Startups	93
Comment VIII.B.1. – Stringency of Startup Emissions Limits:	93
Comment VIII.B.2. – Limits On Startup Duration:	101
Comment VIII.B.3. – Average Startup Limits:.....	104
Issue VIII.B.4. – Restriction on Simultaneous Startups of Both Turbines:	105

C. BACT Technology Review	105
1. “Fast-Start” Integrated Once-Through Steam Boiler Technology	105
Comment VIII.C.1. – Potential For Using Fast-Start Technology With Highly Efficient Triple-Pressure Steam Turbine Generating Equipment:.....	105
Comment VIII.C.2. – Use of Single-Pressure “Flex-Plant 10” Technology:.....	108
Comment VIII.C.3. – Potential For Using “Rapid Response” Technology:.....	110
2. Auxiliary Boiler Systems	114
Comment VIII.C.4. – Potential for Using Auxiliary Boiler To Reduce Startup Emissions:.....	114
3. Low-Load “Turn-Down” Technology.....	116
Comment VIII.C.5. – Use of Op-Flex Low-Load “Turn-Down” Technology:.....	116
Comment VIII.C.6. – OpFlex Comments in EPA Region IX Colusa Permit Proceeding:.....	118
Comment VIII.C.7. – Availability of Siemens Low-Load Turn-Down Product:.....	119
4. Miscellaneous BACT Technology Choice Issues.....	120
Comment VIII.C.8. – Use of “Best Work Practices” As BACT for Startups:.....	120
Comment VIII.C.9. – Future Consideration of Emerging Startup Technologies:.....	120
Comment VIII.C.10. – Use of Solar Technology to Reduce Startup Emissions:.....	120
D. Frequency of Startups And Implications For BACT Analysis.....	121
Comment VIII.D.1. – Number and Frequency of Startups/Shutdowns:.....	121
IX. COMMISSIONING PERIOD ISSUES	126
Comment IX.1. – Length of Commissioning Period:.....	126
X. SULFURIC ACID MIST ISSUES.....	127
Comment X.1. – Sulfuric Acid Mist Emissions and Compliance with PSD Requirements:.....	127
Comment X.2. – Sulfuric Act Mist Compliance Testing:.....	128
Comment X.3. – Information on Sulfuric Acid Mist Testing:.....	128
XI. DIESEL FIREPUMP ISSUES	129
Comment XI.1. – Restrictions on Diesel Firepump Hours of Use:.....	129
Comment XI.2. – Use of Electric Motor For Firepump:.....	129
XII. MONITORING ISSUES	130
Comment XII.1. – Monthly Sulfur Monitoring:.....	130
Comment XII.2. – Use of PG&E Sulfur Data:.....	130
Comment XII.3. – Parametric Particulate Matter Monitoring:.....	131
XIII. PSD AIR QUALITY IMPACT ANALYSIS ISSUES.....	132
A. Air Quality Impact Modeling and Analysis Issues Generally	132
Comment XIII.A.1. – Currentness of Air Quality Impact Analysis Methodology:.....	132
Comment XIII.A.2. – PM ₁₀ Air Quality Impact Analysis:.....	133
Comment XIII.A.3. – Use of Existing Monitoring Data To Assess Ambient Air Quality at Project Location:.....	134

Comment XIII.A.4. – Location of Meteorological and Background Air Quality Monitoring Data:.....	134
Comment XIII.A.5. – Accuracy of Emissions Data and Modeling Results:	136
Comment XIII.A.6. – Designation of Project Location as “Rural” for AERMOD Modeling: ..	137
Comment XIII.A.7. – Use of Data and Modeling Results:.....	139
Comment XIII.A.8. – Completeness of Information Presented in Analysis:	140
Comment XIII.A.9. – Changes Made Since Earlier 2007 Air Quality Impacts Analysis:	140
Comment XIII.A.10. – Shoreline Fumigation Analysis for Startup Emissions:	140
B. Air Quality Impact Modeling and Analysis Issues Related to PM_{2.5}	141
Comment XIII.B.1. – SIL Exceedance and Requirement to Conduct Full Impact Analysis for PM _{2.5} :	145
Comment XIII.B.2. – Basis for PM _{2.5} “Significant Impact Levels”:.....	146
Comment XIII.B.3. – Inclusion of Precursors in the PM _{2.5} Analysis:.....	149
Comment XIII.B.4. – Selection of Nearby Point Sources For Full Impact Analysis:	155
Comment XIII.B.5. – Selection of Nearby Non-Point Sources for Full Impact Analysis:.....	158
Comment XIII.B.6. – Incorrect Identification of Highway Segments:.....	159
Comment XIII.B.7. – Results of AERMOD Modeling Analysis:	159
Comment XIII.B.8. – Background Ambient PM _{2.5} Levels:.....	161
Comment XIII.B.9. – Consideration of Greenhouse Gases on Formation of PM _{2.5} :.....	163
Comment XIII.B.10. – Final Version of Applicant’s Source Impact Analysis:	165
Comment XIII.B.11. – Conclusion of No Contribution To A Violation of NAAQS or PSD Increment:.....	166
Comment XIII.B.12. – Potential For Impacts Above the SIL in Adjacent Non-Attainment Areas:.....	167
Comment XIII.B.13. – Use of AERMOD to Model Impacts at Point Reyes National Seashore:	167
Comment XIII.B.14. – Don Edwards National Wildlife Sanctuary as a Class I Area:	169
C. Soils & Vegetation Analysis	169
Comment XIII.C.1. – Analysis of Soils & Vegetation Impacts.....	169
Comment XIII.C.2. – Survey of Existing Soils & Vegetation Resources:.....	170
Comment XIII.C.3. – Analysis of Potential Soils & Vegetation Impacts from Nitrogen Deposition:.....	171
Comment XIII.C.4. – Analysis of Potential Impacts to Wildlife:	174
Comment XIII.C.5. – Analysis of Impacts To Aquatic Soils & Vegetation Resources:	175
Comment XIII.C.6. – Compliance With NAAQS as Evidence of No Adverse Impacts:.....	176
Comment XIII.C.7. – Air Quality Impact Analysis Public Review Process:	177
Comment XIII.C.8. – Use of Soils & Vegetation Analysis Guidance Documents:	177
Comment XIII.C.9. – Use of 1980 EPA Screening Procedure:.....	178
Comment XIII.C.10. – Currentness of Reference Materials Relied On:	178

Comment XIII.C.11. – Identification of the Facility’s Proximity to Specific Soils & Vegetation Resource Locations:	179
Comment XIII.C.12. – Analysis of Potential for Impacts to Lichens:	179
Comment XIII.C.13. – Photosynthetic Generation of Oxygen By Plants:	179
D. “Associated Growth” And “Secondary Emissions” Analyses	180
Comment XIII.D.1. – Emissions Associated With Project Workforce:	181
Comment XIII.D.2. – Potential for New Growth and Development That May Use Electricity From The Facility:	181
Comment XIII.D.3. – Wastewater Treatment Plant Expansion:	182
XIV. HEALTH RISK ASSESSMENT ISSUES	184
Comment XIV.1. – Methodology Used in Health Risk Assessment:	184
Comment XIV.2. – Exposure Assumptions for Chronic Risk Assessment:	185
Comment XIV.3. – Assessment of Cumulative Risks From Project In Conjunction With Other Sources of Toxic Risk:	185
Comment XIV.4. – Health Risk Assessment for Ammonia Emissions:	186
Comment XIV.5. – Legionnaire’s Disease:	186
Comment XIV.6. – Including Startup Emissions In Health Risk Assessment:	187
Comment XIV.7. – Health Risk Assessment for Aircraft Pilots and Passengers:	188
Comment XIV.8. – Health Impacts of Fine Particulate Matter:	189
Comment XIV.9. – Consideration of CO ₂ Emissions in Assessing Health Risks:	190
XV. ENVIRONMENTAL JUSTICE ISSUES	192
Comment XV.1. – Demographics of Project Location:	192
Comment XV.2. – Mitigation Measures and the Local Community:	192
Comment XV.3. – Use of Health Risk Analysis to Evaluate Potential Impacts to Local Residents:	193
Comment XV.4. – Cumulative/Synergistic Impacts Analysis:	193
Comment XV.5. – Environmental Justice Outreach:	194
XVI. THE FEDERAL PSD PERMIT EVALUATION AND ISSUANCE PROCESS	195
Comment XVI.1. – Compliance With PSD Delegation Agreement:	195
Comment XVI.2. – Compliance with EAB Remand Order:	196
Comment XVI.3. – Compliance with NSR Workshop Manual:	196
Comment XVI.4. – Time Period for Processing Permit Application:	196
Comment XVI.5. – Discretion to Deny Permit For Project That Satisfies All Requirements For PSD Permitting:	198
Comment XVI.6. – Non-Attainment NSR Permitting For Projects Impacting Adjacent Non-Attainment Areas:	198
Comment XVI.7. – Integration of Non-Attainment NSR and PSD Permitting:	199
Comment XVI.8. – History of Permitting Process:	199

XVII. FEDERAL PSD PERMIT NOTICE & COMMENT REQUIREMENTS	201
A. Public Notice of District Actions.....	201
Comment XVII.A.1. – Public/Agency Notification of PSD Review Process:	201
B. Information Provided to the Public/Explanation of Basis for Proposed Permit.....	201
Comment XVII.B.1. – Statement That A PSD Permit Was Issued In 2002:.....	201
Comment XVII.B.2. – Identification of Project Location:	202
Comment XVII.B.3. – Information Regarding Procedural Posture of Permitting Action:	203
Comment XVII.B.4. – Information Regarding Project Ownership:.....	204
Comment XVII.B.5. – Additional Detailed Information Not Required For PSD Permit Analysis:	205
Comment XVII.B.6. – General Criticisms of the Statement of Basis:	206
Comment XVII.B.7. – Responses To Questions Submitted by Commenters:	206
C. Opportunities For Public Comment.....	206
Comment XVII.C.1. – Opportunities to Submit Comments:.....	206
Comment XVII.C.2. – Openness to Considering Public Comments:.....	208
Comment XVII.C.3. – Other Communications Received Outside of the Formal Notice-and-Comment Process:.....	208
Comment XVII.C.4. – Recirculation For Further Public Comment:.....	209
Comment XVII.C.5. – Multi-Jurisdictional Permitting Process:.....	209
D. Public Availability Of Supporting Information	210
Comment XVII.D.1. – Public Availability of the Permitting Record:	210
Comment XVII.D.2. – Air District Responses to Requests for Documents Under the California Public Records Act:	211
E. Prior Permitting History	213
Comment XVII.E.1. – No PSD Permit Issued in 2002:.....	213
Comment XVII.E.2. – Changes to Federal PSD Permit Since 2007:.....	214
XVIII. STATE-LAW LICENSE/PERMIT ISSUES	216
Comment XVIII.1. – Reopening State-Law Permitting Proceedings:.....	216
Comment XVIII.2. – Expiration of Authority to Construct:	217
Comment XVIII.3. – Non-Attainment NSR Permitting:.....	218
Comment XVIII.4. – NO ₂ Impacts and Compliance With California Ambient NO ₂ Standard:	218
Comment XVIII.5. – Compliance with CEC and Authority to Construct Monitoring Requirements:	219
Comment XVIII.6. – Compliance with CEC Condition AQ-SC10:.....	219
Comment XVIII.7. – California Environmental Quality Act Issues:	219
Comment XVIII.8. – Emissions Offsets and ERCs Identified in the Determination Of Compliance:.....	220

XIX. OTHER ISSUES NOT RELATED TO FEDERAL PSD PERMIT REQUIREMENTS.....	223
Comment XIX.1. – Endangered Species Act:	223
Comment XIX.2. – National Environmental Policy Act:	223
Comment XIX.3. – Other Federal Statutes:.....	224
Comment XIX.4. – Coastal Management Concerns:.....	224
Comment XIX.5. – National Register of Historic Places:	225
Comment XIX.6. – Hazardous Air Pollutant (HAP) Emissions Under CAA Section 112:	225
Comment XIX.7. – 40 C.F.R. Section 60.11(d):	225
Comment XIX.8. – Noise Impacts:.....	226
Comment XIX.9. – Potential Hazards to Aviation:	226
Comment XIX.10. – Impacts To Operations at Area Airports:	227
Comment XIX.11. – Generalized Support For and Opposition To Project:.....	228
Comment XIX.12. – Project Aesthetics:.....	228
Comment XIX.13. – Need for the Project:	228
Comment XIX.14. – Use of New Facility to Replace Older Facilities:	229
Comment XIX.15. – Alternatives to the Project:.....	230
Comment XIX.16. – Job Creation:	230
Comment XIX.17. – Consistency With Other Air Quality Regulatory Programs:	230
Comment XIX.18. – Effect on Property Values:.....	231
Comment XIX.19. – Wastewater Storage:	231
Comment XIX.20. – Flood Protection:.....	231
Comment XIX.21. – Air District Permitting of Gateway Generating Station:.....	232
Comment XIX.22. – EPA Enforcement Action Regarding Gateway Generating Station:	234
Comment XIX.23. – Consistency with AB 32 and Hayward Climate Action Plan:	234
Comment XIX.24. – Earthquake Hazard:.....	234

I. INTRODUCTION AND SUMMARY OF CHANGES MADE IN FINAL PERMIT

The Air District is issuing a Federal Prevention of Significant Deterioration (“PSD”) permit to Russell City Energy Company, LLC, for construction and operation of the Russell City Energy Center. The Russell City Energy Center will be a nominal 600-MW natural gas fired combined-cycle power plant located at 3862 Depot Road in Hayward, CA, near the corner of Depot Road and Cabot Boulevard.

The Air District is issuing this Federal PSD Permit after a comprehensive permitting review to ensure that the facility will comply with all requirements of the Federal PSD program under the Clean Air Act. The Air District summarized its analysis of the facility and how it will comply with applicable Federal PSD requirements in the Statement of Basis for this project, which the Air District published on December 8, 2008, along with its initial proposal to issue this permit. The Air District solicited public comment on the December 2008 Draft PSD Permit and accompanying Statement of Basis, and accepted written comments until February 6, 2009. The Air District also held a public hearing at Hayward City Hall to receive comments in person on January 21, 2009. Based on the comments received during this first comment period, as well as on additional review and analysis by Air District staff, the District revised its proposal. The Air District published a revised Draft PSD Permit on August 3, 2009, along with an Additional Statement of Basis summarizing the Air District’s analysis on which the revised draft permit was based. The Air District then held a second public comment period on the revised Draft PSD Permit, and accepted written comment until September 16, 2009. The Air District also held a second public hearing at Hayward City Hall on September 2, 2009.

The Air District has carefully considered all of the comments it received during both public comment periods. The Air District is now issuing a final Federal PSD Permit based on the District’s analysis and on the public comments it has received. The Air District’s responses to the public comments it received, during both comment periods, are set forth in this document pursuant to the requirements of 40 C.F.R. Section 124.17. Section 124.17 requires that the Air District respond to significant comments received during the public comment periods. The Air District is going beyond this minimum requirement, however, and is also responding to certain comments that are not relevant to any Federal PSD permit issues as well as certain communications on this permit that were not received during the two public comment periods. The Air District is providing these additional responses out of recognition of the public’s interest in these issues and in order to provide the public with as much information as possible regarding this project.

Based on the Air District’s review of the public comments, as well as on its own further analysis, the Air District is making the following changes from the draft permit it published, which are reflected in the Final Permit. These changes are outlined here in summary form, and are discussed in greater detail in the relevant sections of this document.

- **Carbon Monoxide Emissions Limits:** The Air District has lowered the emissions limit on carbon monoxide from 4.0 parts per million volume on a dry basis (ppmvd), corrected to 15% oxygen averaged over any rolling 3-hour period, to 2.0 ppmvd corrected to 15% oxygen, averaged over a 1-hour period. (*See Condition 19(d).*) This change was made in response to public comments suggesting that lower levels than 4.0 ppmvd are achievable

for this facility. Carbon monoxide issues are discussed in Section V of this Response to Comments document.

- **Particulate Matter Emissions:** The Air District has lowered the emissions limit on particulate matter from the gas turbines and heat recovery boilers from 9 pounds per hour to 7.5 pounds per hour. (*See* Condition 19(h).) The Air District has also lowered the particulate-matter-related limit on total dissolved solids in the facility’s cooling water from 8,000 ppm to 6,200 ppm, which will reduce the particulate matter emissions from the cooling tower. (*See* Condition 44.) The Air District made these changes based on further review and analysis of available data on what level of emissions control is achievable for this facility. The Air District is also clarifying that the particulate matter limits will apply both to PM₁₀ and to PM_{2.5}, which is a subset of PM₁₀ that has recently come under heightened regulatory scrutiny. Particulate matter issues are discussed in Section VI of this Response to Comments document.
- **Startup Emissions Limits:** The Air District has lowered several of the emissions limits applicable during turbine startups. The District has lowered the limit on emissions of nitrogen dioxide (NO₂) during “hot” startups – when a turbine is started up after less than eight hours of downtime – from 125 pounds per startup to 95 pounds per startup. The District has also lowered the limit on emissions of carbon monoxide during startups in two areas. For hot startups, the District has lowered the carbon monoxide limit from 2514 pounds per startup to 891 pounds per startup; and for cold startups – when a turbine is started up after more than 48 hours – the District has lowered the carbon monoxide limit from 5028 pounds to 2514 pounds. (*See* Condition 20.) These changes were made based on comments suggesting that lower limits than the Air District initially proposed would be achievable for this facility, based on the experiences of other similar facilities. The Air District is also imposing a requirement that both turbines cannot be in startup mode at the same time, which is a condition of the California Energy Commission’s license for the facility but was inadvertently left out of the proposed PSD permit. Startup and shutdown issues are discussed in Section VIII of this Response to Comments document.
- **Voluntary Limits on Greenhouse Gas Emissions:** The Air District has also imposed additional and more stringent limits on the emissions of greenhouse gas pollutants, including carbon dioxide, nitrous oxide and methane, based on the applicant’s voluntary request to include such limits. Greenhouse gases are not currently regulated by EPA and are not covered by any Federal PSD regulatory requirements at this time, but the applicant has nonetheless requested that the Air District undertake a BACT analysis for greenhouse gases and impose enforceable greenhouse gas limits in the permit. Based on the applicant’s voluntary request, the Air District is imposing limits on hourly, daily and annual emissions of CO₂-equivalent greenhouse gases (“CO₂e”). The Air District is also imposing a limit on the facility’s heat rate per unit of power output, which is related to its energy efficiency. Ensuring that the facility’s heat rate is kept within the applicable limit will ensure that it is being maintained at a high level of efficiency, which will reduce greenhouse gas emissions per unit of power generated. The Air District is also imposing greenhouse gas emission limits on the emergency diesel firepump engine and the facility’s circuit breakers, as well as appropriate monitoring requirements to ensure

compliance with these limits. (*See* Conditions 50-61.) Greenhouse gas issues are discussed in Section II of this Response to Comments document.

- **Further Refinement of Supporting Analyses:** The Air District has also conducted further analysis in a number of areas to ensure that the facility will satisfy all Federal PSD permitting requirements. While not directly resulting in changed permit conditions, these additional analyses help strengthen this permit and are described in the appropriate sections below. The additional analyses are addressed in various places throughout this Response to Comments document.
- **Formatting and Typographical Corrections:** The District has also made minor, non-substantive corrections to correct formatting and typographical errors contained in the draft permit it published. These changes do not affect the substance of the permit.

II. ISSUES REGARDING THE POWER GENERATION EQUIPMENT PROPOSED FOR THIS FACILITY

The Air District received a number of comments regarding the type of electrical generating equipment the applicant intends to use at the Russell City Energy Center and whether it is consistent with the Best Available Control Technology (“BACT”) requirements of the Federal PSD permitting program. Although many comments were specific to emissions of individual PSD-regulated pollutants (or potentially PSD-regulated pollutants such as greenhouse gases), a number of them were directed at BACT issues generally, such whether alternative equipment might be cleaner and more efficient in general. In this section the Air District addresses the general comments about BACT for this equipment. Additional pollutant-specific (or operating scenario-specific) BACT comments are addressed in subsequent sections.

Comment II.1. – Currentness of Combustion Turbine Technology:

The District received a number of comments regarding the type of electrical generating equipment the applicant intends to use at the Russell City Energy Center, and in particular whether it will be the cleanest and most efficient equipment consistent with the Best Available Control Technology requirements of the Federal PSD permitting program. Some of these comments stated that the Air District incorrectly based its BACT analysis for the combustion turbines/heat recovery boilers on the equipment that the applicant has already purchased and intends to use at the facility. Some comments questioned whether other equipment besides what the applicant intends to use for the project would be able to achieve lower emission rates. Although many of these comments were specific to emissions of individual PSD-regulated pollutants (or potentially PSD-regulated pollutants such as greenhouse gases), a number of them were directed at whether alternative equipment might be cleaner and more efficient in general.

Response: At the outset, the Air District notes generally that it agrees with the premise underlying these comments that the BACT permit requirements established for a facility need to be based on the emissions performance of the best equipment currently available, and may not be based on a lower level of performance of older equipment simply because an applicant may have already purchased existing equipment. The commenters are incorrect, however, in implying that the Air District bases its BACT determinations on the performance of older equipment in situations where an applicant may have already purchased equipment that it would like to use at a facility. To the contrary, the Air District bases its BACT limits on the emissions performance of the most current technology. Where appropriate, the Air District has not hesitated to impose more stringent limits for this project than were considered achievable in 2002 when the project was first permitted. For example, when the Air District initially proposed to issue this PSD permit, it proposed a NO₂/NO_x limit of 2.0 ppm, even though the current BACT limit when the project was initially licensed was considered to be 2.5 ppm.¹ The Air District therefore requires project applicants to comply with the most stringent emissions limits currently achievable for a facility, as defined in the BACT requirements, regardless of whether the applicant has already purchased equipment or not.

¹ See June 19, 2007, Final Determination of Compliance; December 8, 2008, Statement of Basis.

For these reasons, in response to these comments the Air District explored whether there was more efficient generating equipment that the facility could use. The Air District has identified “FD3” turbine technology as the current state-of-the-art electrical generating equipment for a facility of this type, as outlined in detail in Section III.B. below. FD3 turbine technology would allow the facility to achieve an overall thermal efficiency of 56.4% (lower heating value), which is the highest efficiency of any similar plant that the Air District reviewed. This FD3 technology is slightly more efficient than the “FD2” technology that the applicant originally proposed. After further discussions with the project applicant, the applicant has agreed to upgrade its equipment to incorporate the more modern FD3 technology. These FD3 upgrades will result in an improvement in the thermal performance of the gas turbines, resulting in a higher efficiency for the plant as a whole. That is, they will result in a reduction in the plant’s “heat rate”, which is the amount of fuel required to produce a megawatt (MW) of electricity, making the gas turbine’s efficiency comparable to the best F-Class turbines available on the market today. The Air District is basing its BACT determinations on this state-of-the-art technology, not on the FD2 technology used in the turbines that the applicant originally proposed.

The FD3 upgrades will consist of decreasing the clearances in the compressor section of the turbine, adjusting the inlet guide vanes and optimizing the control system components. More specifically, the upgrades will include the following:

- The inlet guide vanes will be opened more to increase airflow.
- The existing compressor row 7-15 diaphragm inter-stage labyrinth seal holders will be replaced with honeycomb seals.
- The compressor row 16 blades will be replaced with a new design.
- The gas turbine row 1 blades will be replaced with a new design.
- The gas turbine row 1 ring segments and isolation rings will be replaced with a new improved design.
- The gas turbine row 2 seal housing will be replaced with a new rope seal.
- The gas turbine rows 2 and 3 vane sealing will be enhanced.
- The gas turbine row 4 blade ring assembly, consisting of blade rings, vanes, ring segments and inter-stage seal housing will be replaced with a new design.
- The gas turbine row 4 blades will be replaced with a new design.
- The existing exhaust cylinder will be replaced.

The Applicant will also implement operational and maintenance changes recommended by the original equipment manufacturer to improve performance, reliability and maintainability of the equipment. In addition, the Applicant will replace the control system with Siemens’ latest control technology, known as the “T-3000” system.²

² See Email Memorandum re “RCEC: GHGs BACT Analysis Technical Documentation”, from K. Poloncarz, Calpine Counsel, to A. Crockett, BAAQMD, April 2, 2009.

With these upgrades, the turbines the applicant has already purchased will, for all emissions performance purposes, be the equivalent of FD3 turbines commercially available today. These upgrades will increase the plant's overall efficiency such that the rate of emissions per unit of energy produced will be reduced, which will allow the facility to meet a BACT standard set by the emissions rate achievable by FD3 turbines. Based on this FD3 technology, the facility will be able to achieve a thermal efficiency of 56.4%, which is the highest efficiency of any similar plant the Air District reviewed. This highly efficient technology will generate fewer emissions for a given amount of power generation than any other similar facility. The Air District is basing its proposed BACT permit conditions on this current technology.³

The Air District is therefore basing its BACT permit conditions on the emissions performance of this current state-of-the-art FD3-level technology, and not on some lesser performance level based on older equipment. The Air District notes, however, that it is not proposing permit requirements specifying exactly what equipment must be used to satisfy the applicable BACT permit limits. BACT requires emission limits to be imposed based on the best emissions performance achievable by current state-of-the-art technology, but once the BACT limits are established based on this technology as the Air District is proposing, the specific equipment the facility uses to achieve that limitation is irrelevant. As long as the facility keeps emissions within the BACT emission standards, it does not matter what particular choice of equipment the facility uses to do so. Certainly, from an environmental standpoint the choice is irrelevant because it is the emissions that impact air quality not the make or model of the equipment that generates them. If the applicant can meet current emission standards by upgrading existing equipment, there may be significant benefits to be gained, such as avoiding the costs of purchasing new equipment that would ultimately be borne by ratepayers and avoiding the waste inherent in junking serviceable equipment. But how the applicant meets current emission standards is up to the applicant. What matters from an air quality perspective – and what matters

³ The BACT analyses for certain specific pollutants and/or specific operating scenarios depend on other factors such as the availability of add-on controls, *etc.* But to the extent that emissions performance is linked to turbine efficiency, the emissions performance from these FD3-equivalent turbines will be the lowest achievable because FD3 turbines are the most efficient for this type of application. The main gist of the comments the Air District received regarding turbine efficiency were primarily directed at greenhouse gases (to the extent that these are regulated NSR pollutants subject to BACT), but the Air District did also receive some comments directed at the efficiency of the equipment for purposes of the BACT analyses for other pollutants as well. The Air District responds that, to the extent that emissions of those other pollutants are a function of turbine efficiency (*i.e.*, the amount of criteria pollutants emitted is proportional to the amount of fuel burned in generating power output), the Air District's turbine efficiency analysis would be the same for criteria pollutants as it would be for greenhouse gases. The Air District has reviewed the turbine equipment available for this type of facility and has found that the FD3-equivalent turbines are the most efficient in terms of fuel used per unit of power output. Thus, the facility will emit the lowest amount of greenhouse gases per unit of power generated, and will also emit the lowest amount of criteria pollutants per unit of power generated (to the extent that criteria pollutant emissions are proportional to fuel usage). The comments provided no information to suggest that an efficiency analysis undertaken for the purpose of finding the most efficient turbines for greenhouse gases would not also be appropriate to find the most efficient turbines for criteria pollutants as well.

for purposes of the Federal PSD Permit requirements – is whether the limits established in the permit reflect the maximum emission reductions achievable for the source using current technology. As demonstrated in the Air District’s BACT analyses (as set forth in more detail in the rest of this document), the limits the District is imposing on this facility are all based on current technology. Since the limits that the facility will be subject to are based on current technology, issues such as the date of manufacture or purchase of the specific equipment the applicant may choose to install are not relevant for purposes of the Federal PSD Permit.

The Air District published this additional analysis based on the comments received during the first comment period. It did not receive any further substantive comments on the District’s conclusions that it is basing its BACT permit conditions on current state-of-the-art technology, and not on outdated technology simply because the applicant already owns existing equipment as these comments implied. The only further comments the Air District received on this issue during the second comment period were general assertions that the equipment proposed for the facility is old and does not reflect current technology. These further comments did not identify any specific reasons why the Air District’s assessment outlined above that its BACT analysis is based on current best technology is incorrect. The Air District therefore finds no reason in these further general comments to conclude that its assessment is not correct. For all of these reasons, the Air District disagrees that the BACT requirements it is imposing in the Federal PSD Permit are based on old, outdated equipment.⁴

Comment II.2. – Use of Duct Burners to Generate Additional Power:

The District also received comments asserting that the proposed design of using duct burners to generate additional steam to power the steam turbine is not the most efficient method to generate additional power to meet peak demand. These comments asserted that duct burners are inefficient and reduce the fuel efficiency (and thus increase the air emissions) of the facility. They stated that the Air District should have considered alternatives to duct burners, such as simple-cycle turbines or solar alternatives, to meet peak load demand.

Response: In response to these comments, the Air District considered further whether the use of duct burners satisfies the BACT requirement. Upon further consideration, the District has concluded that there are no more efficient alternatives that would meet the power generation

⁴ In one specific comment, commenters pointed to a set of PowerPoint slides from Siemens Corp. and suggested that the information in the slides shows that there are superior alternatives to the proposal for the facility, published at [www.netl.doe.gov/technologies/coalpower/turbines/refshelf/papers/Siemens_SGT6-5000F%20\(W501F\)%20Engine%20Enhancements%20to%20Improve%20Op.pdf](http://www.netl.doe.gov/technologies/coalpower/turbines/refshelf/papers/Siemens_SGT6-5000F%20(W501F)%20Engine%20Enhancements%20to%20Improve%20Op.pdf). These commenters also referenced a document entitled “Advanced Power Plant Development and Analyses Methodologies Final Report”, published at www.netl.doe.gov/technologies/coalpower/fuelcells/seca/pubs/reports/UCI%20Final%20Report%20DE-FC26-00NT40845.pdf, although they did not claim that it implicates the proposed facility or explain how it could impact the proposed permitting action. These commenters also cited a 1997 paper from EPRI regarding startup of a Siemens peaking turbine (www.mydocs.epri.com/docs/public/TR-108609.pdf), although again they did not explain how it has any bearing on the current permitting action. The Air District has reviewed these documents and did not find anything to suggest that its permitting analysis is flawed in any respect.

needs for which this facility was designed. The facility is designed to meet a maximum power demand of nominally 600 megawatts, but a 2x1 combined-cycle facility without duct burning can meet a nominal demand of only 550 megawatts.⁵ Duct burning is an efficient way of generating additional power to meet peak demand from the combustion turbine exhaust. Duct burning involves burning additional natural gas in the ducts to the heat recovery boiler, which increases the temperature of the exhaust coming from the combustion turbines and thereby creates additional steam for the steam turbine. In response to these comments, the Air District evaluated whether the additional peak capacity could be more efficiently provided by other technologies besides duct burning.⁶

The Air District first evaluated the alternative of replacing the duct burners with simple-cycle generating technology (*i.e.*, “peaker” turbines) that could generate approximately the same amount of energy during peak demand periods. Simple-cycle turbines would not be more efficient than duct burning here, however. To the contrary, simple-cycle turbines of similar capacity would have a higher heat rate (*i.e.*, take more fuel to produce a unit of power) than duct burning. The incremental additional heat rate using duct burning to generate peak capacity (rated at 46.3 MW) is 7,595 Btu/kWhr (LHV).⁷ In comparison, a basic GE LM6000 gas turbine generator set, rated at 42.3 megawatts, would have a heat rate of 8,308 Btu/kWh (LHV); with additional features, a GE LM6000 Sprint (“Spray-Intercooled Turbine”), rated at 46.9 megawatts, would have a heat rate of 8,235 Btu/kWh (LHV).⁸ Duct firing will therefore be a

⁵ Combustion turbines come only in discrete size classes, and so it is not always possible to design a facility to meet the demand called for using turbines alone. Where it is not possible, some way of making up the additional capacity must be used. (Note that these are nominal capacities; actual power output from a specific facility at any given time depends on a large number of design and operational variables.) The facility’s design capacity cannot be achieved here by use of a 2x1 turbine configuration alone without some additional peak power.

⁶ It is not clear whether the BACT analysis requires a consideration of alternatives to duct firing to meet peak capacity demand. The BACT analysis is not intended to require the applicant to change its design from construction of a combined cycle to simple cycle facility or to eliminate and replace key elements of its design with different sources. (*See, e.g., In re Kendall New Century Development*, PSD Appeal No. 03-01, 11 E.A.D. 40, 51-52 (EAB 2003) (finding that, in identifying BACT for a proposed peaking generating facility, the permitting authority “does not have authority to require [the Applicant] to construct a facility with larger combustion units or one that would run in combined-cycle mode since this would change the intended nature of the Facility”); *see also In re Prairie State Generating Co.*, PSD Appeal No. 05-05, 13 E.A.D. ___, slip op. at 32, *aff’d sub. nom Sierra Club v. U.S. Env’tl Protection Agency*, 499 F.3d 653 (7th Cir. 2007) (referencing the EAB’s recognition in *In re Kendall New Century Development* that “it [is] appropriate for the permitting authority to distinguish between electric generating stations designed to function as ‘base load’ facilities and those designed to function as ‘peaking’ facilities, and that this distinction affects how the facility is designed and the pollutant emissions control equipment that can be effectively used by the facility”).) This issue is moot here, however, as the Air District has concluded that there are no superior alternatives even if such an analysis were required.

⁷ *See* Russell City Energy Center Heat Balance Diagrams.

⁸ GE Aero Energy Products, brochure, LM6000 SPRINT™ Gas Turbine Generator Set, available at: www.gepower.com/prod_serv/products/aero_turbines/en/downloads/lm6000_sprint.pdf.

more efficient method of generating peak capacity than installation of the most efficient form of simple-cycle generation capacity the Air District is aware of. The Air District therefore concludes that the use of a simple-cycle turbine would not provide any advantage over duct burning.

Moreover, even if it were not for the superior performance of Russell City Energy Center's duct burners in comparison to an LM6000, replacement of duct burners with a separate simple-cycle unit would likely be eliminated from consideration as BACT based upon the significantly greater cost and ancillary environmental impacts. According to a report prepared by the California Energy Commission, the cost to replace the proposed Russell City Energy Center's peaking capacity with a simple cycle plant would be approximately \$507.98 per MWhr for an investor-owned utility (IOU) plant or \$647.28 per MWhr for a "merchant" plant.⁹ In contrast, the total estimated cost for a 550-MW combined cycle plant with duct firing is approximately \$95.59 or \$103.52 per MWhr for an IOU or merchant plant, respectively;¹⁰ whereas the cost for a combined cycle facility without duct firing is estimated for an IOU and merchant plant at \$94.47 or \$102.19 per MWhr, respectively.¹¹ In light of these estimates, the marginal cost associated with duct firing at a facility like the proposed Russell City Energy Center would appear substantially more favorable than the cost to replace its peak capacity with a separate simple-cycle unit. The Air District therefore concludes the cost of requiring simple-cycle peak power generation would be obviously excessive, and thus would not be required as BACT for this additional reason as well.

The Air District also examined the potential for using solar thermal technology as an alternative to using duct burners in response to this comment.¹² The Air District reviewed the approach taken with the proposed Victorville 2 Hybrid Power Project, which utilizes solar technology to eliminate some of the need for duct burning to address peak demand. The Victorville Project will be a 570-MW facility located in the Mojave Desert and will consist of natural gas-fired, combined-cycle generating equipment integrated with solar thermal generating equipment. The solar thermal component of the Victorville "hybrid" Project will consist of a series of diurnal, single-axis-tracking parabolic trough solar collectors laid out in parallel rows aligned on a north-south horizontal axis. Each solar collector will track the sun from east to west to assure that it continuously reflects the greatest amount of sunlight possible onto a "linear receiver", which contains a heat transfer fluid that circulates through the receiver and returns to a series of heat exchangers, where it is used to generate high-pressure steam for two heat recovery steam

⁹ California Energy Commission, *Comparative Costs of California Central Station Electricity Generation Technologies*, Final Staff Report, December 2007, CEC-200-2007-011-SF, at pp. 10, 12; available at: www.energy.ca.gov/2007publications/CEC-200-2007-011/CEC-200-2007-011-SF.PDF. An LM6000 is the equivalent of "Small Simple Cycle" (50 MW) in the Energy Commission's report. Dollar figures are given in nominal 2007 dollars.

¹⁰ *Id.* at p. 12.

¹¹ *Id.* at p. 10.

¹² Requiring a facility to be redesigned to use solar-powered generation instead of natural gas would constitute "redefining the source" in contravention of the Federal PSD BACT requirements. The Air District considered the potential for a solar alternative nonetheless, and has concluded that even if BACT could be construed to allow a redesign of the project in this manner, a hybrid solar alternative would not be available here as explained below.

generators (HRSGs). The solar thermal input is intended to provide approximately 10% of the power generated by the facility during peak periods. Use of solar thermal equipment is projected to increase the overall thermal efficiency of the combined-cycle plant from 52.7% to 59% (LHV) because it would allow the facility to reduce firing of the duct burners during peak periods and replace that peak capacity with the input from the solar thermal generating equipment.¹³ In comparison to Victorville's 59% efficiency rating (LHV) during such periods, the Russell City Energy Center's efficiency rating would be 56.44% (LHV) during periods of duct burning.¹⁴

A solar alternative to duct burning would not be feasible for the Russell City facility, however, because there is far less available area at the project location than in the Mojave Desert, and the compact site would not provide adequate space for installation of a solar collectors. To construct a solar thermal plant to replace some of the peak capacity from duct burning would need 275 acres of land,¹⁵ which would not be feasible given the space-constrained project site on the edge of the San Francisco Bay.¹⁶ Redesigning the project to incorporate a solar system like Victorville's would therefore require the facility to be moved to another location, making it impossible to achieve the project objectives served by the current location, which include "[t]o locate near centers of demand and key infrastructure, such as transmission line interconnections, supplies of process water (preferably wastewater), and natural gas at competitive prices",¹⁷ and "[t]o serve the electrical power needs of the East Bay, San Francisco Peninsula, and City of San Francisco."¹⁸ Requiring additional space to build a solar system would also eliminate the environmental benefits of locating adjacent to the City of Hayward's waste water treatment plant so the facility can recycle approximately 4 million gallons per day of effluent from the plant and eliminate discharges of that waste water to the San Francisco Bay, and of locating at a

¹³ City of Victorville, *Application for Certification, Victorville 2 Hybrid Power Project*, February 28, 2007, at 2.1-2.14; available at www.energy.ca.gov/sitingcases/victorville2/documents/applicant/afc/. Again, it is not clear that the BACT requirement is intended to involve replacement of duct firing to meet peak capacity demand with a completely different type of facility design, but that issue is moot because the Air District has found that solar peaking capacity would not be feasible here.

¹⁴ See Table, Comparison of FD3 Turbines with and without duct burner firing, prepared by Alex Prusi, P.E., Director of Engineering, Calpine, April 2, 2009.

¹⁵ See City of Victorville, *Application for Certification, Victorville 2 Hybrid Power Project*, February 28, 2007, at p. 2-3; available at www.energy.ca.gov/sitingcases/victorville2/documents/applicant/afc/.

¹⁶ The project site for the Russell City Energy Center is a 16.5-acre area located in the West Industrial District of Hayward, California, adjacent to the City of Hayward Water Pollution Control Facility and near existing transmission facilities. (See California Energy Commission, *Final Commission Decision, Russell City Energy Center* (October 2007) (available at www.energy.ca.gov/2007publications/CEC-800-2007-003/CEC-800-2007-003-CMF.PDF) (hereinafter, "2007 Energy Commission Decision"), at p. 10.

¹⁷ California Energy Commission, *Commission Decision, Russell City Energy Center* (July 2002, P800-02-007) (hereinafter, "2002 Energy Commission Decision"), pp. 17 (available at: www.energy.ca.gov/sitingcases/russellcity/index.html).

¹⁸ Calpine, *Application for Certification, Russell City Energy Center* (May 2001) (hereafter, "RCEC Application for Certification"), at pp. 9-2 – 9-22 (available at: www.energy.ca.gov/sitingcases/russellcity/documents/applicant_files/afc/vol-1/).

previously-developed brownfield site. For these reasons, the Air District has found that thermal solar peaking capacity is not an available alternative to reduce the facility's use of duct burning to generate peak capacity.

For all of these reasons, the Air District disagrees with the comments that there are alternative methods to generate the additional peak capacity needed to meet the facility's design load that should be required as part of a BACT analysis. The Air District published this further analysis in the Additional Statement of Basis and made it available for further comment during the second comment period. During the second comment period, the Air District received comments questioned the District's assertion that a hybrid solar facility such as the Victorville project would not be feasible at the proposed project location. These comments claimed that the conclusion that 275 acres of land would be needed for such a facility was based on solar technology as of 2001, and that the technology may have since changed to allow a hybrid solar plant using less space. The comments also claimed that there is over 275 acres in the San Francisco Bay and in industrial areas of the City of Hayward, and that the applicant should consider whether these types of areas could be used for a hybrid solar facility. The comments also suggested considering whether a facility using half the area or twice the area of the District's estimated 275 acres could be feasible. Finally, some comments also noted that the City of Hayward recently published a Request for Proposals for an adjacent solar facility.

The Air District disagrees that anything in these additional comments provides any reason to conclude that a solar hybrid alternative would be feasible here, even if the BACT analysis could allow the District to require such a redesign of the facility. As discussed in the Additional Statement of Basis, the design requirements for the facility call for approximately 50 MW of additional power generation capacity. (See Additional Statement of Basis at pp. 9-12.) It is simply not possible to site 50 MW of solar capacity at the facility's location, which is only 16.5 acres in size.¹⁹ All of the hybrid solar facilities the Air District is aware of with sufficient capacity to satisfy 50 MW of load show that current solar technology cannot produce anywhere near 50 MW on a site of this size. The proposed Victorville project described above would require 275 acres to produce approximately 50 MW – and those acres are in the Mojave Desert.²⁰ The proposed Palmdale Hybrid Power Project, a similar natural-gas powered facility with additional solar thermal generating equipment that would provide approximately 10% additional capacity, will require approximately 250 acres for its solar field, with an overall site size of 377

¹⁹ Some comments noted that the analysis in the Additional Statement of Basis discussing the whether a hybrid solar facility could be used incorrectly stated that the current proposed project site is 14.7 acres. These commenters pointed out that this site size refers to the project location that was initially proposed, not the current location. The correct size of the current project location is 16.5 acres. (See 2007 Energy Commission Decision, *supra* note 16, at p. 10.) The additional 1.8 acres would not allow the project to accommodate a hybrid solar design, and so this misstatement does not make any difference in the outcome of the Air District's analysis.

²⁰ The solar field will encompass approximately 250 acres, while the power-plant site overall is 275 acres. See City of Victorville, *Application for Certification, Victorville 2 Hybrid Power Project*, February 28, 2007, at p. at 2-3, 2-12; available at www.energy.ca.gov/sitingcases/victorville2/documents/applicant/afc/.

acres.²¹ Solar-only projects also require a large amount of land, as evidenced by the proposed Ivanpah Solar Electric Generating System, which will require 3,400 acres to generate 400 MW;²² the proposed Carrizo Energy Solar Farm, which will require 640 acres to generate 177 MW;²³ and the proposed Beacon Solar Energy Project, which will require 2,012 acres to generate 250 MW²⁴).

Furthermore, nothing in these comments provides any contrary evidence to show that a hybrid solar option could be implemented at the facility's location. Some comments did reference the fact that the City of Hayward has proposed a 1,000-kW (1 MW) photovoltaic solar project located at the City's Water Pollution Control Facility near the Russell City site.²⁵ The project will use solar energy to partially offset the electricity currently acquired from PG&E for wastewater treatment.²⁶ The photovoltaic system will be installed on the ground and occupy about 8 acres within the existing Water Pollution Control Facility site.²⁷ While a photovoltaic system can substantially offset the electricity demands of the Water Pollution Control Facility, it cannot provide an alternative to duct burning for providing 50 MW of additional capacity at the Russell City Energy Center. Assuming a potential of 1 MW per 8 acres, 400 acres would be required to generate the 50 MW needed by the Russell City Energy Center to meet peak demand. As such, replacement of the proposed facility's duct burners with photovoltaic solar generating capacity is not a feasible alternative for the project.

The Air District therefore concludes, based on all of the evidence before it, that it would not be possible to implement a hybrid solar facility for this project without requiring the facility to be moved to another location, which would make it impossible to achieve the project objectives served by the current location, and would eliminate the environmental benefits of locating adjacent to the City of Hayward's waste water treatment plant, near existing transmission facilities, and at a previously-developed brownfield site.²⁸

²¹ Palmdale Hybrid Power Project, *Application for Certification* (July 2008) at 2-1, 2-4, available at: www.energy.ca.gov/sitingcases/palmdale/documents/applicant/afc/volume_01/.

²² See California Energy Commission, Ivanpah Solar Electric Generating System (Docket No. 07-AFC-5), available at: www.energy.ca.gov/sitingcases/ivanpah/index.html.

²³ See California Energy Commission, Carrizo Energy Solar Farm Power Plant Licensing Case (Docket No. 07-AFC-8), available at www.energy.ca.gov/sitingcases/carrizo/index.html.

²⁴ See California Energy Commission, Beacon Solar Energy Project (Docket No. 08-AFC-2), available at: www.energy.ca.gov/sitingcases/beacon/index.html.

²⁵ City of Hayward, Water Pollution Control Facility, 1,000 kW Photovoltaic Renewable Energy Project, Environmental Initial Study/Draft Mitigated Negative Declaration (Sept. 2009), available at: <http://user.govoutreach.com/hayward/faq.php?cid=11037>.

²⁶ *Id.* at 1.

²⁷ *Id.* at 5.

²⁸ See generally discussion in Additional Statement of Basis at p. 12. The project objectives include “[t]o locate near centers of demand and key infrastructure, such as transmission line interconnections, supplies of process water (preferably wastewater), and natural gas at competitive prices” and “[t]o serve the electrical power needs of the East Bay, San Francisco Peninsula, and City of San Francisco.” *Id.* (citing California Energy Commission, *Commission Decision, Russell City Energy Center* (July 2002, P800-02-007) at 17, available at

Comment II.3. – Design of Facility For Intermediate-To-Baseload Service:

The District also received comments noting that the facility would be operated to meet contractual load and spot sale demand, and may not operate on a full-time, base-loaded basis. These comments questioned the anticipated operating mode of the proposed Russell City Energy Center, suggesting that if it were intended for load-following or other duty that would involve frequent startup and shutdown events, the Applicant should be required to construct a fast-start-capable, peaking-to-intermediate duty plant instead.

Response: The Air District has considered this issue further in light of these comments. The Air District notes that the Federal PSD Permit process is designed to ensure that a proposed facility will be as low-emitting as possible (among other requirements). It is not designed to require an applicant to propose a different type of project of a different fundamental scope and design, for example to substitute a simple-cycle peaking plant instead of a combined-cycle intermediate-to-baseload project as the commenters suggest here.²⁹ Moreover, it would not make any sense from an emissions standpoint to require a simple-cycle facility for the purpose that this facility is intended to be used for, which is to serve intermediate-to-baseload capacity. Simple-cycle facilities are less efficient than combined-cycle facilities, which recover the heat from the turbine exhaust (which would simply be emitted and wasted in a simple-cycle facility) and use it to generate additional electricity. Simple-cycle facilities are therefore generally inferior to combined-cycle facilities, except for applications where the generating capacity must come on-line in a very short time frame, which is not the case with the uses for which this facility has been proposed and designed. The Air District therefore disagrees that it should require the applicant to redesign the facility as a simple-cycle peaking facility. (*See also* discussion in Response to Comments VIII.C.2. and VIII.D.1.)

Comment II.4. – Sources of Emissions Estimates:

Some comments also criticized the Air District for relying on emissions estimates from the project applicant and from the CEC in its explanation of the emissions from the project (*see, e.g.*, discussion on pp. 12-13 of the December 8, 2008, Statement of Basis).

Response: The Air District disagrees with the comments that it is inappropriate to use these sources of information in assessing the potential emissions from the project. To the contrary, the project applicant and the CEC are among the best sources of information about potential emissions from the facility based on their detailed knowledge and understanding of the proposed project and the type of operation involved. Moreover, the Air District has not seen any suggestion that any of the emissions estimates the Air District relied on may be unreliable in any way, or that there may be alternative sources of emissions estimates that it should consider instead, and the commenters have not provided any information to support such a conclusion. And in any event, the Air District is proposing to turn the emissions estimates into enforceable emissions limits in the PSD permit, along with monitoring and recordkeeping requirements to

www.energy.ca.gov/sitingcases/russellcity/index.html; RCEC Application for Certification, *supra* note 18, at pp. 9-3 - 9-4.

²⁹ This principle has been well established by the Environmental Appeals Board in reviewing PSD permits. *See, e.g., In re Prairie State Generating Co.*, *supra* note 6, slip op. at 32; *In re Kendall New Century Development*, *supra* note 6, at 51-52.

ensure that actual emissions stay below these limits. Thus, if the underlying estimates turn out to be inaccurate and actual emissions exceed the estimates as they have been incorporated into the permit limits, the facility will be in violation of its permit and will have to shut down or curtail operations unless it can fix whatever problems are causing the increased emissions. For all of these reasons, the Air District disagrees that it is inappropriate to consider emissions estimates from the project applicant or from the CEC in its permitting analysis.

The Air District published this analysis in the Additional Statement of Basis and invited the public to comment on it during the second comment period. In particular, the Air District invited the public to provide any further information as to how and why these sources of information may be unreliable and whether there are alternative sources of emissions information that would be relevant to the PSD permitting process for this facility that the Air District should take into account. The Air District did not receive any further comments identifying any reasons how or why these sources could be unreliable or stating that the Air District should rely on other sources instead. The Air District therefore concludes that that relying on information from the applicant and the CEC is appropriate in a PSD permitting analysis, and disagrees with the comments that suggested otherwise.

The Air District did receive further comments during the second comment period that questioned the District's assertions that if the applicant and manufacturer's data on emissions performance turn out to be incorrect and the equipment at the facility cannot in fact meet the BACT permit limits, the facility will be in violation of its permit conditions and will have to shut down or curtail operations unless it can fix whatever problems are causing the increased emissions. These comments claimed that these assertions were incorrect based on the experiences of other power plants. They cited the Calpine Metcalf and Sutter power plant and implied that those facilities are being allowed to pollute more than their permit limits (although the comments stated that the facilities had applied for and received amended permit conditions, which suggests that the facilities are not in fact exceeding their permitted limits). They also cited the PG&E Gateway facility, which they stated is not being required to shut down or curtail operations despite not having a current PSD permit. The comments implied that these facilities show that permitted facilities do not have to comply with their permit conditions. The comments also suggested that the District impose a condition in the permits that the facility cannot apply for or receive modified permit conditions.

In response to these further comments, the Air District disagrees that this facility will be allowed to exceed its permit limits once they are established. Permit limits create legal obligations and EPA regularly takes action to enforce them. The PG&E Gateway facility, cited in the comments, is an example of such enforcement action. When EPA determined that the facility was constructed in violation of the Federal PSD Permit requirements, it issued a Finding and Notice of Violation for the facility, filed a Complaint in federal District Court, and has proposed a Consent Decree which, if approved by the Court, will require PG&E to pay a monetary penalty and take additional steps to ensure future compliance. Some commenters have disagreed with certain elements of the proposed Consent Decree, for example in the size of the monetary penalty EPA is seeking or the terms of the injunctive relief, but there can be no dispute that EPA is taking enforcement action to address the violations it has identified. (*See also* discussion in Response to Comment XIX.22.) Moreover, with respect to the Metcalf and Sutter facilities, the

Air District is not aware of any violations of PSD permit conditions at those facilities that have not been subject to enforcement action, and the comments have not identified any. To the extent that those facilities have had their permits amended, permit amendments can be granted only if the amendments comply with applicable legal requirements, including PSD requirements. There is nothing inappropriate about such amendments, and the permitting process needs to accommodate amendments to allow facilities to modify and upgrade their equipment over time. The Air District therefore disagrees that it should (or could) include a condition that the facility cannot apply for or receive modified permit conditions. To the extent that the facility requests a permit amendment in the future, the Air District will address the appropriateness of the amendment at the time based on applicable legal requirements.

Comment II.5. – Review of Individual System Components:

The Air District also received comments claiming that it should not just look at the overall emissions performance achievable by other combined-cycle facilities as a whole. These commenters claimed that the District should review each of the elements of the overall system, including the turbine, HRSG, and add-on control devices, in determining what would be the best achievable emissions performance.

Response: The Air District agrees that in certain circumstances a BACT analysis should examine individual system components to determine what level of emissions performance is achievable from the power generating system as a whole. Where appropriate, the Air District has undertaken this level of analysis and is imposing BACT limits based on this level of analysis. In other cases, where the achievable emissions performance from the system as a whole is well-understood and the individual system components have been used together in the same way at many other similar sources, the analysis can look to the overall performance achieved by similar sources without a detailed analysis of each individual system component. The NO₂ emissions performance of gas turbines using Dry Low-NO_x combustors in conjunction with an SCR system is one such example. Ultimately, what level of detail needs to be applied in the BACT analysis is subject to a rule of reason that must be applied in each specific case. The Air District agrees that in appropriate cases, the BACT analysis must look at individual system components to determine how the system as a whole can be configured to achieve the lowest BACT emissions level, and has done so here. The Air District found nothing in the comments to suggest that it failed to apply the appropriate level of detail in any particular BACT analysis, and no commenter suggested that any of the BACT limits should be set at a lower level based on a more detailed review of individual system components that the Air District conducted.

Comment II.6. – Specific Turbine Details:

Commenters asked for detailed information about the combustion turbines that the manufacturer intends to use at the facility, such as turbine serial numbers, dates of manufacture, cost, *etc.*

Response: Specific details such as these are not relevant to determining the Best Available Control Technology and applicable permit limits for this equipment or for analyzing the potential air quality impacts of the facility, and so the Air District has not sought such information from the applicant. For example, if the Air District determines that a certain type of turbine is BACT and imposes a BACT permit limit based on the achievable emissions performance for such a turbine, it makes no difference which particular turbine is used (*e.g.*, which particular serial

number) as long as the facility complies with the applicable permit conditions. The Air District disagrees that such specific information is relevant to the Federal PSD Permitting analysis. To the extent that information about particular types of turbines is relevant (*e.g.*, costs, ancillary environmental or energy impacts, relative efficiency, achievable emissions performance standards, *etc.*) the Air District has sought that information and provided it in the relevant areas of its permitting analysis.

The Air District included this further discussion of the issue in the Additional Basis, and received comments during the second comment period that specific equipment details such as turbine serial numbers, dates of manufacture, cost, *etc.*, are important because the commenters believe that the turbines may be used or remanufactured turbines. The comments asserted that if they are overhauled turbines, their pollution characteristics may differ from the original manufacturer's specifications. The Air District has no information on which to evaluate these claims that the turbines that Calpine intends to use at the facility may be used or remanufactured, and the comments have not provided any information to support this contention beyond mere speculation. But regardless, it does not matter whether the turbines are new or used as long as they can meet the BACT emissions limits, which are based on the best performance of current, state-of-the-art equipment. The Air District disagrees that there is anything about such specific, detailed turbine information that is relevant to the PSD permit analysis, or that the Air District needs to obtain and publish such information as part of the permit process.

Comment II.7. – Technology-Forcing BACT Requirements:

The Air District received comments noting that the BACT requirement is intended to be technology-forcing, and that the greatest achievable level of control will improve over time as new control technologies develop. These comments stated that the District is relying on emissions performance achieved at existing facilities, and not looking at what the best achievable performance for a new facility is. These comments also criticized the District for providing a “compliance margin” by proposing BACT limits that were somewhat higher than the best emissions performance achieved by comparable facilities.

Response: The Air District agrees that the BACT requirement is intended to be technology-forcing and that in general BACT limits will improve over time as new technologies develop. The stringent permit limits the Air District is imposing in this permit, which are more stringent than similar BACT limits imposed in other permits issued in the past, are evidence of this fact. The Air District disagrees, however, that it has not implemented the technology-forcing BACT requirement properly for this facility. As documented in the District's Statement of Basis, Additional Statement of Basis, and other supporting documents, the Air District did canvass the current state-of-the-art control technologies, including technologies that are currently in use and technologies that are being newly developed. Based on these analyses, the Air District imposed the most stringent permit limits achievable in accordance with the BACT requirements. The Air District has not necessarily based its limits on the lowest emissions ever achieved in a test result from a particular technology, and where necessary it has provided a reasonable and justified compliance margin to ensure that the limits are achievable under all operating scenarios. But the Air District disagrees that doing so is inappropriate. To the contrary, providing an appropriate compliance margin is required under BACT to ensure that the BACT limits are achievable. For

these reasons, the Air District disagrees with the comments that its approach to setting BACT limits is inconsistent with the federal PSD requirements.

III. GREENHOUSE GAS ISSUES

As the Air District explained in the Statement of Basis and Additional Statement of Basis, the project applicant has voluntarily agreed to accept binding, enforceable limits on greenhouse gas emissions despite EPA's indications that greenhouse gas regulations are not subject to the PSD permit requirements of 50 C.F.R. Section 52.21 at this time. The Air District therefore proposed greenhouse gas BACT limits in its initial draft permit in December of 2008. The Air District received numerous comments on that initial proposal during the initial comment period, and it then substantially revised the analysis based on the insightful comments received and on additional analysis by District staff and submissions by the applicant. The Air District then published its revised proposal in the revised draft permit in August of 2008, and received further comment during the second public comment period. The Air District is now finalizing greenhouse gas limits in the PSD permit it is issuing for the Russell City facility, and it responds to the comments received on the greenhouse gas BACT issues as set forth below.

A. Applicability of PSD Permit Requirements to Greenhouse Gas Emissions

Comment III.A.1. – Applicability of Federal PSD Program to Greenhouse Gas Emissions:

A number of comments claimed that CO₂ (as well as other greenhouse gases) are pollutants “subject to regulation” under the CAA, and are therefore subject to PSD review.

Response: In the Statement of Basis and Additional Statement of Basis, the Air District summarized the current state of recent regulatory developments regarding whether greenhouse gases are subject to regulation under the federal PSD program. As the Air District noted in those documents, EPA's Environmental Appeals Board found in November of 2008 in the *Deseret Power* case that EPA as an agency has the discretion to determine whether greenhouse gases should be subject to PSD regulation or not, but had not at that time adopted any definitive policy position on the issue.³⁰ The EAB also suggested that it may be more appropriate for EPA to address this issue through a nationwide rulemaking, rather than through individual case-by-case PSD permitting decisions. The issue was thus in a highly unresolved state when the Air District issued its initial proposal on December 8, 2008. Then, on December 18, 2008, EPA issued a policy memorandum in response to the EAB's *Deseret Power* opinion. The impact of EPA's December 18 memorandum is that EPA is not requiring greenhouse gases to be regulated under the Federal PSD permitting program, at least as of this time.³¹ This continues to be the case

³⁰ See *In re Deseret Power Electric Cooperative*, PSD Appeal No. 07-03, slip op. at 63-65 (EAB Nov. 13, 2008).

³¹ See Memorandum, Stephen L. Johnson, Administrator, *EPA's Interpretation of Regulations that Determine Pollutants Covered by Federal Prevention of Significant Deterioration (PSD) Permit Program*, December 18, 2008 (hereinafter, “PSD Interpretive Memo”); notice provided at 73 Fed. Reg. 80300 (Dec. 31, 2008). EPA has proposed to reconsider the position set forth in the PSD Interpretive Memo, but it is proposing to affirm its interpretation with respect to whether greenhouse gases are subject to regulation under the PSD program. See *Prevention of Significant Deterioration (PSD): Reconsideration of Interpretation of Regulations That Determine Pollutants Covered by the Federal PSD Permit Program, Proposed Rule*, 74 Fed. Reg. 51,535, 51,545-46 (Oct. 7, 2009).

currently. EPA has recently determined that greenhouse gases endanger public health and welfare, which will pave the way for EPA to adopt regulations limiting greenhouse gases from motor vehicles and other sources.³² EPA has also proposed new regulations for greenhouse gas emissions from cars and trucks which, if finalized, would make greenhouse gases subject to PSD regulation.³³ But these regulations are still only at the proposal stage, and EPA continues to treat greenhouse gases as not yet subject to the PSD program until such time as specific regulations for greenhouse gases from specific sources are adopted and take effect. The Air District is therefore finalizing the permit on the basis that greenhouse gases are not subject to PSD at this time, since EPA's new regulations have not yet been finalized. However, as explained in the Statement of Basis and Additional Statement of Basis, the applicant has voluntarily requested the District to undertake a greenhouse gas BACT analysis and impose enforceable greenhouse gas BACT limits as if greenhouse gases were currently subject to PSD requirements. The Air District has done so, and is imposing greenhouse gas limits in the final permit based on the applicant's voluntary agreement to be subject to these requirements. The Air District therefore disagrees with these comments that greenhouse gases are subject to PSD requirements, but concludes that the issue is moot because the facility would satisfy all PSD requirements for greenhouse gases even if they were legally applicable at this time.

Comment III.A.2. – Regulation of Greenhouse Gas Emissions Under Other Authorities:

A few comments argued that greenhouse gases should be subject to regulation in this permit for other reasons as well. One implied that the District could impose greenhouse gas limits in this permit under authority of California law; and others claimed that greenhouse gases should be regulated (i) because an EPA website recognizes climate change impacts of greenhouse gases and (ii) in light of the U.S. Supreme Court decision in *Massachusetts v. EPA*.

Response: The District disagrees that it could impose greenhouse gas conditions under California law (or could impose any other state-law conditions, for that matter) in a federal PSD permit. It is certainly true that greenhouse gas issues are the subject of various California statutes and are being addressed by various California regulatory agencies, including the Air District, but that does not mean that the District can impose permit conditions under California law in a federal permit issued on behalf of the federal EPA.

The District also disagrees that simply because greenhouse gas impacts are noted on an EPA website that EPA considers them “subject to regulation” for purposes of PSD permitting. EPA is free to opine about air pollution issues on its website without making them “subject to regulation” for PSD purposes. Nothing in the website references cited by the commenters suggests that EPA has established that greenhouse gases are “subject to regulation” under the PSD program.

³² See Final Rule, Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act (Dec. 7, 2009).

³³ See *Proposed Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards* (GHG Light Duty Vehicle Rule), 74 Fed. Reg. 49,454 (Sept. 28, 2009), issued jointly by EPA and the National Highway Transportation Safety Administration (NHTSA); see also *Prevention of Significant Deterioration (PSD) and Title V Greenhouse Gas Tailoring Rule*, 74 Fed. Reg. 55,292 (Oct. 27, 2009).

The District also disagrees with the comments' characterization of *Massachusetts v. EPA* as holding that greenhouse gases are "subject to regulation" under the Federal Clean Air Act. That case determined that greenhouse gases are within the definition of "air pollutant" as used in the Clean Air Act; it did not address the question of whether greenhouse gases are pollutants that are "subject to regulation" under the Clean Air Act.³⁴

Comment III.A.3. – Regulation of Greenhouse Gases as a Contributor to Criteria Pollutant Formation:

The Air District also received comments that raised an issue concerning greenhouse gases involving the potential for CO₂ emissions to contribute to increased ozone and particulate matter pollution in the vicinity where the CO₂ emissions occur. These commenters cited recently-published research findings by Mark Z. Jacobson, a researcher at Stanford University, who has posited that locally-emitted CO₂ will form "domes" over urban areas where it is emitted, which will cause localized temperature increases under the "CO₂ domes", and the localized temperature increases will in turn increase the rate of formation of ozone and particulate matter in such areas.³⁵

Response: The Air District disagrees that the recent research paper cited by these commenters establishes that the Air District should consider greenhouse gases to be pollutants subject to regulation under the federal PSD program. The Air District notes that the concern expressed in this paper is similar to the general concern that has been expressed about greenhouse gases and the secondary pollution impacts that would arise from warmer temperatures on a global scale. This study is interesting in that it is the first time (that the Air District is aware of) that scientific research has focused on these issues on a local scale. With respect to whether the paper's findings mean that the Air District should treat greenhouse gases as pollutants "subject to regulation" for PSD permitting purposes, the Air District first notes that concerns about temperature increases from the greenhouse effect having secondary impacts on criteria pollutant formation have been known for some time, and yet have not led EPA to treat greenhouse gases as "subject to regulation" at this point as outlined above. The Air District is bound to follow EPA guidance with respect to the Federal PSD program, and so the Air District does not have the discretion to depart from EPA's position in response to a study such as this one. Moreover, since concerns about secondary pollutant effects from warming temperatures globally have not led EPA to consider greenhouse gases "subject to regulation" at this stage, it seems unlikely that consideration of such concerns on a local scale would do so either (at least, at this point in the evolution of EPA's approach to greenhouse gas regulation). This point is especially applicable here, where the first research supporting this hypothesis has only just emerged and there has not yet been time for a scientific consensus to develop around it. But in any event, as with all of these arguments about whether greenhouse gases should be considered "subject to regulation",

³⁴ See generally *In re: Christian County Generation, LLC*, PSD Appeal No. 07-01, 13 E.A.D. ___, slip op. at 7 n. 12 (EAB Jan. 28, 2008).

³⁵ See *The Enhancement of Local Air Pollution by Urban CO₂ Domes*, Mark Z. Jacobson (Oct. 3, 2009) (hereinafter, "Jacobson Paper") (available at: www.stanford.edu/group/efmh/jacobson/CO2loc0709EST.pdf). Note that some commenters cited an earlier version of this paper dated April 3, 2009. Dr. Jacobson has since posted an updated version.

the issue is moot because the applicant has voluntarily agreed to have the Air District treat greenhouse gases as if they are regulated and to impose greenhouse gas BACT limits, as the Air District has done.

B. Greenhouse Gas BACT Technology Analysis For Combined-Cycle Power Generation Trains

In order to derive appropriate BACT limits for greenhouse gas emissions, the Air District conducted an assessment of available and feasible control technologies. (See Statement of Basis at pp. 59-61; Additional Statement of Basis at pp. 17-24.) The Air District addresses comments it received on these issues here.

Comment III.B.1. – Feasible Control Technologies for Greenhouse Gas Emissions:

During the initial comment period, no commenters disagreed with the District’s assessment that the only feasible control technology for reducing greenhouse gas emissions is to use the most efficient electrical generating technology, and that at present there are no feasible post-combustion add-on controls. One commenter expressly stated its agreement with the District’s assessment that the only currently feasible control option for CO₂ is more efficient energy production. The Air District noted the lack of disagreement on this point in its Additional Statement of Basis, and in the second comment period some commenters did express disagreement with the Air District’s conclusion that carbon sequestration is not a feasible control technology at this point in time. These comments stated that subterranean sequestration and bio-sequestration of pollutants in algae-producing ponds may be viable alternatives.³⁶

Response: In its December 2008 Statement of Basis, the Air District considered carbon capture and sequestration but eliminated it as an available control technology for purposes of its BACT analysis because it cannot feasibly be implemented on a large-scale power plant at this point in time.³⁷ The Air District provided two main reasons for this conclusion. First, emerging carbon capture and sequestration technologies are in their infancy and are not currently feasible for projects such as the Russell City Energy Center. In particular, there are currently no carbon capture and sequestration systems commercially available for full-scale power plants in the United States. Second, even if carbon capture and sequestration were sufficiently developed, the feasibility of a system for a particular power plant would depend on the availability of appropriate sequestration sites in the vicinity of the plant. Although basins within Alameda County are under investigation for the potential for carbon sequestration, there are no such sites that have been demonstrated as appropriate for sequestration at this time.

The Air District has found no reason to revisit this analysis based on the further comments it received. The Air District conducted further investigation in light of these comments, and found

³⁶ Some comments also suggested that the project’s greenhouse gas emissions could be lowered by using “Fast-Start” technology. As described in the responses to comments on startup issues (see *infra*, Section VII.C.), Fast-Start technology would actually increase emissions of greenhouse gases from the facility because of the inherently lower energy efficiency of facilities equipped with Fast-Start.

³⁷ See Statement of Basis at pp. 60-61.

further evidence to support its earlier conclusion. At the federal level, the U.S. Department of Energy is in the midst of a three-phase effort to develop an infrastructure and knowledge base to foster commercialization of carbon sequestration technologies.³⁸ The first phase characterized the potential for CO₂ storage in the U.S. and Canada; the second phase consists of small-scale geological storage tests; and the third phase will conduct large-scale sequestration projects.³⁹ Injections are expected to begin at some sites as early as spring 2010.⁴⁰

At the state level, Assembly Bill 1925 (Blakeslee, Chapter 471, Statutes of 2006) directed the California Energy Commission “to submit a report to the Legislature containing recommendations for how the state can develop parameters to accelerate the adoption of cost-effective geologic sequestration strategies for the long-term management of industrial carbon dioxide.” To this end, WESTCARB, the West Coast Regional Carbon Sequestration Partnership (funded by the U.S. Department of Energy and the California Energy Commission) issued an initial report in 2008.⁴¹ This report characterized issues associated with carbon capture and sequestration technology and determined areas needing further analysis. A follow-up report will include results of WESTCARB field pilots and foundational data and analysis to support development of an appropriate regulatory framework.⁴² This report is planned for 2010 and is not yet available.

The Air District also found several sequestration projects have been proposed in California, although the development of the technology is still in its infancy. For example, in Kern County, Clean Energy Systems is building an oxy-combustion power plant beneath which the WESTCARB partnership will inject 250,000 tons of CO₂ per year for four years.⁴³ The approximately 50 MW plant and associated CO₂ clean-up, compression, and injection systems are projected to come online in mid-2011.⁴⁴ Also in Kern County, Hydrogen Energy International LLC is proposing to build an integrated gasification combined cycle power generating facility.⁴⁵ The plant would gasify petroleum coke (or blends of petroleum coke and coal, as needed) to produce hydrogen to fuel a combustion turbine operating in combined cycle mode.⁴⁶ The gasification component would capture approximately 90 percent of the CO₂ during

³⁸ See U.S. Department of Energy, Carbon Sequestration Regional Partnerships (available at: www.fossil.energy.gov/sequestration/partnerships/index.html).

³⁹ *Id.*

⁴⁰ *Id.*

⁴¹ Burton, *et al.*, Geologic Carbon Sequestration Strategies for California, CEC Systems Office Report to the Legislature (2008) at 21.

⁴² See Burton, *et al.*, *Informing Policy Development for Geologic Carbon Sequestration in California*, Energy Procedia 1 (2009) (hereafter, “Informing Policy Development”) at 4,619, available at: www.sciencedirect.com/.

⁴³ See Factsheet for WESTCARB Field Validation Test at 1, (available at: www.netl.doe.gov/publications/proceedings/08/rcsp/factsheets/22-WESTCARB_Large%20Volume%20Sequestration%20Test_PhIII.pdf.)

⁴⁴ *Id.*

⁴⁵ For the project’s website, see www.hydrogenenergycalifornia.com/default.aspx?pageid=1. For California Energy Commission review information, see www.energy.ca.gov/sitingcases/hydrogen_energy/index.html.

⁴⁶ *See id.*

steady-state operation, which would be transported via pipeline to the Elk Hills Field for CO₂ enhanced oil recovery and sequestration.⁴⁷ Commercial operation is expected to begin in 2015.⁴⁸ These proposed projects represent promising developments and indicate that carbon sequestration may someday provide a viable alternative for emissions control for power plants. However, its availability for a project such as the proposed facility appears to be even farther off in the future, given that the projects proposed for sequestration, such as the Hydrogen Energy project, all would rely on a fuel that has a higher carbon content in its emissions stream (*i.e.*, a “dirtier” fuel) than natural gas. Research into potential application of carbon capture and sequestration technology to facilities burning natural gas is still in its infancy.⁴⁹

For example, the Energy Commission recently held a workshop to begin considering the feasibility of potential application of carbon capture and sequestration technology to new or retrofitted natural gas-fired combined-cycle power plants.⁵⁰ However, these efforts are very preliminary in nature, with the current “Phase 1” efforts amounting to an engineering and economic assessment to identify existing or proposed plants in Pacific Gas and Electric Company’s (PG&E) service area that might be outfitted with carbon capture and storage technology. These Phase 1 efforts will conclude with development of a preliminary scope, cost, and schedule estimate for construction of “a pilot-scale (nominally 15–50 Megawatts) technology validation test” applying carbon capture and storage technology to a natural gas-fired combined-cycle power plant in PG&E’s service territory. This example illustrates that planning efforts currently underway for potential application of carbon capture and sequestration technology to a natural gas-fired power plant are still in their earliest stages and have not even progressed to pilot-scale testing yet. In light of this, such technology cannot be found to be technically feasible for purposes of a full-scale operation.

To move carbon capture and sequestration projects to the commercial stage will require surface and subsurface site characterization; monitoring and verification of stored CO₂; health, safety and environmental risk assessment and management; and remediation and mitigation planning.⁵¹ These issues need to be addressed through consistent and integrated protocols.⁵² According to a recent assessment, “[c]urrently no consensus or standard exists to set criteria for these components that will adequately or even minimally address the potential concerns of operators,

⁴⁷ *Id.*

⁴⁸ See Revised Application for Certification for Hydrogen Energy California, Vol. 1 (May 2009) at 1-4 (available at: www.energy.ca.gov/sitingcases/hydrogen_energy/documents/applicant/revised_afc/Volume_I/1.0%20Executive%20Summary.pdf).

⁴⁹ See, e.g., Matthew L. Wald, “A Bid to Cut Emissions Looks Away From Coal”, New York Times, October 31, 2009 (available at: www.nytimes.com/2009/11/01/science/earth/01carbon.html?_r=1&scp=2&sq=carbon%20capture&st=cse).

⁵⁰ See California Energy Commission, “Staff Workshop, West Coast Regional Carbon Sequestration Partnership (WESTCARB): Assessment of Natural Gas Combined Cycle (NGCC) Plants with CO₂ Capture and Storage” (announcing workshop held on January 10, 2010); (available at: www.energy.ca.gov/contracts/2010-01-14_WESTCARB_Pre-Proposal_Workshop.pdf).

⁵¹ *Informing Policy Development*, *supra* note 42, at 4,621.

⁵² *Id.* at 4,622.

regulators, and other stakeholders.”⁵³ EPA has proposed federal requirements under the Safe Drinking Water Act (SDWA) that would apply to owners and operators of injection wells that will be used for CO₂ injection for geologic sequestration.⁵⁴ The proposed requirements address endangerment to underground sources of drinking water posed by improperly managed geologic sequestration projects.⁵⁵ Like the large-scale field pilots, a comprehensive regulatory framework, including health and safety criteria, is still in the very early stages. For these reasons, subterranean sequestration of carbon cannot be considered a feasible control technology for purposes of a BACT analysis at this time.

The Air District also considered the comments’ reference to bio-sequestration of carbon in algae-producing ponds. Research has begun on an emerging technology that would use “algae bioreactors” to sequester carbon dioxide emissions. An algae bioreactor would house huge quantities of algae that would use CO₂ captured from a power plant for photosynthesis. Although the technology is potentially promising, it is also in its infancy and is not feasible at this time as an add-on control technology.⁵⁶ Moreover, the comment on this point did not provide any information on how the facility could feasibly implement bio-sequestration, it simply referenced the technology and suggested that the Air District study it. The Air District has done so in response to this comment, but disagrees that bio-sequestration is currently feasible control technology that could be required here as part of a greenhouse gas BACT technology review.⁵⁷

For these reasons, the Air District disagrees that subterranean sequestration or bio-sequestration are appropriate BACT control technologies. These are active areas of research and development, however, and the development of carbon capture and sequestration technologies, both geological and biological, will continue to be monitored.

⁵³ *Id.*

⁵⁴ Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO₂) Geologic Sequestration (GS) Wells; Proposed Rule, 73 Fed. Reg. 43,492 (July 25, 2008). EPA subsequently issued a Notice of Data Availability and Request for Comment that supplements the proposed requirements. *See* 74 Fed. Reg. 44,802 (Aug. 31, 2009).

⁵⁵ 73 Fed. Reg. at 43,497.

⁵⁶ *See* Leland E. Teschler, “Algae Automation”, *Machine Design* (March 3, 2009), available at: <http://machinedesign.com/article/algae-automation-0303>.

⁵⁷ To the extent that the commenter intended “bio-sequestration” to mean simply using vegetation to remove CO₂ from the atmosphere generally, the Air District disagrees that this approach to addressing greenhouse gas emissions could be considered a BACT control technology. BACT control technologies reduce or remove air pollutants before they are released into the atmosphere. Reducing greenhouse gas emissions from the atmosphere once they have been emitted, for example by planting trees or putting algae in ponds to draw CO₂ out of the atmosphere, is more in the nature of offsets than it is a BACT control technology. The Air District therefore disagrees that requiring a facility to plant vegetation to remove CO₂ as a means of addressing its greenhouse gas emissions could be required in a BACT analysis.

Comment III.B.2. – Evaluation of Non-Fossil-Fuel Fired Electrical Generation

Alternatives:

The Air District also received comments stating that it should have evaluated alternative energy production methods that do not rely on fossil fuel combustion, such as hybrid technologies that combine energy sources to improve the overall carbon efficiency of the power plant, requiring co-generation with the project, and changes in project design (e.g., elimination of duct burners, or replacing them with a more efficient microturbine or solar energy collection). The comments claimed that the District should not focus simply on *turbine* efficiency (as opposed to more efficient ways of making electricity without using combustion turbines).

Response: The Air District has considered these comments and is in agreement that the development of non-fossil-fuel electrical generating sources is of critical importance in meeting California’s energy needs while at the same time furthering its air quality goals, especially in light of recent advances in the understanding of the problems posed by global climate change. The Air District recognizes, however, that alternative generating technologies are not currently capable of meeting the state’s electrical power demand at all times and under all circumstances, and that some fossil-fuel generating capacity is still needed.⁵⁸ Determining the most appropriate mix of electrical generation sources under these circumstances is a highly complex engineering and policy exercise that is most appropriately undertaken by the California Energy Commission, the state’s expert agency on energy policy matters. The Air District obviously has a supporting role to play in helping the Energy Commission to understand the air quality impacts of its siting decisions and to include appropriate air quality conditions in its licenses. But as an agency, the Air District does not have the expertise nor the authority to determine what type of generation sources are needed, of what capacity, and where. The Air District must therefore necessarily defer to the Energy Commission’s decision that the proposed natural-gas fired, combined-cycle facility is the most appropriate alternative for this project. If it would be more appropriate to use wind or solar power to serve the function intended for the proposed Russell City project, the Energy Commission is the agency best suited – and specifically tasked by the California legislature – to make that determination.

Here, the Energy Commission specifically evaluated potential non-fossil-fuel-fired alternatives, such as solar, wind, and biomass, in its licensing proceeding for the Russell City Energy Center. The Energy Commission ultimately rejected those alternatives as not feasible because “they do not fulfill a basic objective of the plant: to provide power from a baseload facility to meet the

⁵⁸ See, e.g., *Framework for Evaluating Greenhouse Gas Implications of Natural Gas-Fired Power Plants in California*, consultant report prepared by MRW & Associates for the California Energy Commission (available at: www.energy.ca.gov/2009publications/CEC-700-2009-009/CEC-700-2009-009.PDF); California Energy Commission, *Final Commission Decision, Avenal Energy, Application for Certification* (08-AFC-01), Kings County (Dec. 16, 2009) (hereinafter, “Avenal Energy Commission Decision”), p. 112, Finding of Fact no. 23 (“The addition of some efficient, dispatchable, natural-gas-fired generation will be necessary to integrate renewables into California’s electricity system and meet the state’s RPS and GHG goals, but the amount is not without limit.”) (available at: www.energy.ca.gov/2009publications/CEC-800-2009-006/CEC-800-2009-006-CMF.PDF).

growing demands for reliable power in the San Francisco Bay Area.”⁵⁹ The Energy Commission rejected wind and solar generating sources because of their inherently intermittent nature, which makes them inappropriate for a generating resource intended to ensure an adequate supply of power in periods when solar and wind sources do not provide power to the grid.⁶⁰ The Energy Commission also noted that alternatives like wind and solar involve other environmental trade-offs that can offset the benefits of reduced air emissions. For example, the Energy Commission found that a “wind farm” capable of generating 600 megawatts of power would require 10,200 acres, approximately 690 times the amount of land needed for the Russell City project and associated facilities.”⁶¹ The Energy Commission similarly found that a solar thermal project would require approximately 3,000 acres, or over 200 times the amount of land needed for the Russell City project.⁶² For all of these reasons, the Energy Commission determined that the better policy choice, taking into account all relevant factors, would be the facility as proposed and not a facility using alternative, non-fossil-fuel generating technology.⁶³ The Energy

⁵⁹ 2002 Energy Commission Decision, *supra* note 17, at p. 19. The Energy Commission made a further finding in its 2007 Amendment decision that no renewable alternatives would be able to meet the project’s objectives. *See* 2007 Energy Commission Decision, *supra* note 16, at p. 21, finding 3. In making this finding, the Commission relied in part upon the detailed analyses that were undertaken in connection with the original licensing proceeding in 2002. *See id.*, pp. 20-21.

⁶⁰ 2002 Energy Commission Decision, *supra* note 17, at pp. 18-19.

⁶¹ *Id.*

⁶² *Id.*

⁶³ One alternative that the Energy Commission did not consider was coal-fired generating technologies. Some have argued that coal and natural gas should be considered alternatives of one another, and if this approach were taken then coal should be considered as an alternative along with wind, solar and biomass. To the extent that the Energy Commission even considered this issue, it is likely that it did not undertake a considered evaluation of a coal-fired alternative because in most respects natural gas is a far cleaner fuel. For example, the average emissions rate from existing coal-fired generation in the United States has been estimated by U.S. EPA at 2,249 lbs/MWhr of CO₂. (*See* Environmental Protection Agency, *Air Emissions* (hereinafter EPA Air Emissions Summary), available at www.epa.gov/cleanrgy/energy-and-you/affect/air-emissions.html.) Other sources have estimated an average emissions rate over 2,300 lbs/MW-hr. (*See* California Air Resources Board, *Documentation for Emission Default Factors in Joint Staff Proposal for an Electricity Retail Provider GHG Reporting Protocol R.06-04-009 and Docket 07-OIIP-01* (June 20, 2007), available at: www.arb.ca.gov/cc/ccei/presentations/OOS_EmissionFactors.pdf.) Meanwhile, according to U.S. EPA, “[c]ompared to the average air emissions from coal-fired generation, [combustion of] natural gas produces half as much carbon dioxide,” or about 1,135 lbs/MWhr. (*See* EPA Air Emissions Summary.) Other estimates put this number as low as 800 lbs/MWhr. (*See* Pace, *Life Cycle Assessment of GHG Emissions from LNG and Coal Fired Generation Scenarios: Assumptions and Results*, prepared for Center for Liquefied Natural Gas (Feb. 3, 2009) at p. 13 (available at: www.energy.ca.gov/lng/documents/2009-02-03_LCA_ASSUMPTIONS_LNG_AND_COAL_PDF.) Even the most recent advanced coal generation technologies such as an integrated gasification combined-cycle (IGCC) coal-fired plant, which emits over 1,700 lb/MW-hr, would not come close to the emissions performance of natural gas. (*See id.* at 11-12.) Any comparison

Commission also considered biomass such as wood chips or agricultural waste as a fuel source, but found that such an alternative would not be feasible because no biomass fuel source is available in large enough quantities in the vicinity of the project.⁶⁴

The Federal PSD BACT requirement is not designed to intrude upon this analysis by the expert state agency on power generation and supply policy. To the contrary, Federal PSD permitting explicitly contemplates that PSD permitting authorities will defer to other state agencies on siting decisions.⁶⁵ The Air District therefore disagrees that it should require a further review of alternative types of projects – even if they would involve fewer emissions – because that type of alternatives analysis is properly within the province of the Energy Commission’s siting authority under the Warren-Alquist Act.

The Air District is of course cognizant of its obligation as the Federal PSD permitting authority to provide an independent determination of what the Federal PSD BACT provision requires for a power plant like this one. But the federal BACT framework is clear that it does not require consideration of the use of non-fossil-fuel-fired alternatives, and the Air District therefore could not suggest to the Energy Commission that such alternatives are required by the Federal PSD regulations, regardless of whether there are sound policy reasons to consider them. In determining the Best Available Control Technology for a proposed facility, EPA requires that the Air District examine the best technology for that particular type of facility. EPA requires that the Air District consider the purpose and basic design of the facility, and consider only control technologies consistent with that purpose and basic design. EPA has made clear that the BACT analysis should not include alternative technologies that would require the facility to undergo significant modifications that would alter its fundamental scope, or would change design elements inherent to the facility’s purpose, or would call into question the existence of the facility, or would disrupt the applicant’s basic business purpose for the proposed facility.⁶⁶ Here, non-fossil fuel technologies, such as wind and solar, would not be consistent with the facility’s purpose and basic design. To the contrary, they would require a fundamental change in the facility’s purpose – generating electric power from natural gas combustion – and would require a complete redesign of the basic elements of the facility. Moreover, changing to such technologies would likely call the existence of the facility into question, because it is far from clear whether wind or solar technologies could be used in lieu of combustion technology to meet the power generation demand the proposed facility will serve, according to the Energy Commission’s

of natural gas and coal as fuels would therefore find that natural gas is by far the preferable alternative.

⁶⁴ 2002 Energy Commission Decision, *supra* note 17, at p. 18.

⁶⁵ See *In re Prairie State Generating Co.*, PSD Appeal 05-05, *supra* note 6, slip op. at 44; *In re SEI Birchwood, Inc.*, 5 E.A.D. 25, 27 n.1 (EAB 1994); *In re EcoEléctrica, LP*, 7 E.A.D. 56, 74 (EAB 1997); *In re Kentucky Utils. Co.*, PSD Appeal No. 82-5, at 2 (Adm’r 1982).

⁶⁶ See generally NSR Workshop Manual at p. B.13; *In re Prairie State Generating Co.*, *supra* note 6, slip op. at 32; *In re Kendall New Century Dev.*, *supra* note 6, 11 E.A.D. at pp. 50-52 & n. 14; *In re Hillman Power Co.*, 10 E.A.D. 673, 691-92 (EAB 2002); *In re Knauf Fiber Glass, GmbH*, 8 E.A.D. 121, 136 (EAB 1999); after remand, 9 E.A.D. 1, 31-33 (EAB 2000); *In re SEI Birchwood, Inc.*, 5 E.A.D. 25, 29-30 n.8 (EAB 1994); *In re Hawaii Commercial & Sugar Co.*, 4 E.A.D. 95, 99-100 (EAB 1992); *In re Old Dominion Elec. Coop.*, 3 E.A.D. 779, 793 n. 38 (Adm’r 1992).

findings discussed above. For all of these reasons, the BACT analysis is not required to consider such alternatives.

The Air District published this explanation and analysis in the Additional Statement of Basis and received no further comment on it.

Comment III.B.3. – Evaluation of Most Efficient Combined-Cycle Combustion Turbine Technology:

The Air District received comments criticizing its assessment that the Siemens-Westinghouse 501F turbines the applicant proposed for the project, which the District found to be 55.8% efficient, are the most efficient equipment available. The comments stated that Siemens' new G-class turbines could be used to achieve a net plant efficiency of 58% and are already in operation at a number of plants. The comments also stated that GE "H Class" turbines can achieve 60% efficiency, and have been in operation in Wales and Japan for some time. Comments also claimed that the proposed Siemens F-Class turbines are at the bottom end of the 55.8-56.5% range from similar turbines as evaluated in the Energy Commission's documents, and the District has not explained why more efficient turbines should not have been required. Some comments also questioned the District's reliance turbine efficiency data from the 2007 CEC proceeding, which they was based on data from the 2002 CEC proceeding and testimony that the information had not changed.

Response: In response to these comments, the Air District has further reviewed the types of gas turbine equipment available for this project to ensure that the facility will use the most efficient equipment. As noted above in Section II.A., the Air District found that recent advances in the Siemens F-class turbines have resulted in increased efficiency over the FD2 turbines that the applicant initially proposed. These FD3 upgrades can achieve a gross efficiency of 56.45% (LHV) for the combined-cycle facility (without duct burning), a small but significant increase over the 55.8% for the FD2 turbines as initially proposed. The Air District has therefore determined that an efficiency of 56.45% is achievable using FD3-equivalent technology, and is basing its revised greenhouse gas BACT analysis on this efficiency level.

Beyond the FD3-equivalent technology, the Air District also examined the feasibility and potential emissions performance advantages of using next-generation turbine equipment such as G-Class or H-Class turbines at this facility. For G-Class turbines, this equipment would actually reduce the overall efficiency of the facility and increase greenhouse gas emissions per megawatt of power produced. This is because G-class turbines have a substantially greater power output than F-Class turbines. Thus, in order to build a 612-megawatt combined-cycle power plant as proposed here using G-Class turbines, the Applicant would need to use a substantially smaller steam turbine (143 MW) to provide the equivalent plant output, which is specified at 612.8 MW (net).⁶⁷ This would result in an inefficient bottoming cycle and would lower the overall plant

⁶⁷ See Table, Comparison of Plant Efficiency, 612.8 MW: FD2, FD3, G-Class and Flex 10 Configurations, Prepared by A. Prusi, Calpine, April 2, 2008 (hereinafter, "Plant Efficiency Comparison Table"). Siemens G-class turbines, when initially introduced in 1999, had an output of 235 MW. (See E. Bancalari & P. Chan, Siemens AG, *Adaptation of the SGT6-6000G to a Dynamic Power Generation Market*, December 2005, at 12 (available at: www.powergeneration.siemens.com/news-events/technical-papers/gas-turbines-power-

gross efficiency rating to 49.8% (LHV), according to an analysis provided by the Applicant, compared to the 56.4% efficiency rating of the facility using the latest F-Class technology.⁶⁸ As a consequence, although the G-Class turbines may be marginally more efficient by themselves, when incorporated into a combined-cycle facility of this size they would result in lower efficiency for the facility as a whole. The Air District has therefore concluded that the use of G-class turbines would not be the top-ranked control technology here (*i.e.*, would not lead to the most efficient plant), and would not constitute BACT.

As for H-Class turbines, that turbine class is not yet demonstrated and commercially available for the 60 Hz electrical power system used in the United States, and is therefore not a feasible control technology for purposes of the BACT analysis. GE does have an H-Class turbine that has been fairly well demonstrated for 50 Hz power systems used in other countries. It installed an initial 50 Hz technology validation project at Baglan Bay in Wales that has been in operation since 2003;⁶⁹ and it has a second 50 Hz project in Futtsu, Japan, that began operation in July 2008 (with a second turbine expected to come on-line in late 2009), which GE characterizes as “a key step in the commercial development of [the] H System gas turbine”.⁷⁰ But GE’s H-Class 60-Hz turbine is not as far along in the development process, and the company has only recently installed its first 60-Hz H-class test turbine at the Inland Empire Energy Center in Riverside County, CA, which began operation on January 28, 2009.⁷¹ This project will require extensive testing to ensure that it meets all design specifications and is sufficiently reliable for long-term operations,⁷² and cannot be considered an available technology until this validation process is

[plants/index.htm#AdaptationoftheSGT6-6000GtoaDynamicPowerGenerationMarket](#).) Using two such turbines in a 2x1 configuration would require a 142.8 MW steam turbine to meet a 612.8 MW design capacity (235+235+142.8=612.8). This is a conservative estimate because current G-class turbines are even larger (*see id.*), which would necessitate an even smaller steam turbine and even less overall efficiency.

⁶⁸ See Plant Efficiency Comparison Table, *supra* note 67.

⁶⁹ GE Energy Press Release, *GE’s H System Gas Turbine Hits Project Milestone in Japan* (Dec. 11, 2007), available at www.gepower.com/about/press/en/2007_press/121107b.htm; (hereinafter, “GE H-Class Press Release”); Frank J. Bartos P.E., *New, efficient industrial gas turbines coming: Siemens, GE, Full Report* Control Engineering, (August 8, 2008) (available at http://mobile.controleng.com/article/268171-New_efficient_industrial_gas_turbines_coming_Siemens_GE_full_report.php).

⁷⁰ Steve Bolze, Vice President-Power Generation, GE Energy, *quoted in* GE Energy Press Release, *GE’s H System Gas Turbine Hits Project Milestone in Japan* (Dec. 11, 2007), available at (http://www.gepower.com/about/press/en/2007_press/121107b.htm).

⁷¹ See GE H-Class Press Release, *supra* note 69; Frank J. Bartos P.E., *The Hunt for 60%+ Thermal Efficiency*, Control Engineering (August 1, 2008) (available at www.controleng.com/article/CA6584899.html). The specific startup date for the Inland Empire project was provided by the applicant in communications in April of 2009.

⁷² See generally Frank J. Bartos P.E., *New, efficient industrial gas turbines coming: Siemens, GE, Full Report* Control Engineering, (August 8, 2008) (available at www.controleng.com/article/CA6584786.html?rssid=274) (“Extensive, predefined testing is necessary to ensure that turbine performance meets design specs, along with reliable, long-term operation associated with power systems. With several different technology levels being

completed. As the Energy Commission noted in approving the installation of these H-Class turbines, the “install[ation], operat[ion] and test[ing of] this initial Frame 7H machine [is an] essential step in the development and marketing of this new product[.]”⁷³ The Air District has therefore concluded that H-Class turbines are not an available technology at the present time for this type of project.⁷⁴

Based on this review, the Air District concludes that there is no other commercially available generating technology that would meet the needs of this project that would have a greater energy efficiency than the upgraded “FD3” turbines the applicant has proposed for use at the facility. The Air District also compared the 56.4% efficiency of this facility with other similar facilities in California that have been recently permitted or are currently undergoing review, and found it to be higher than any other comparable facility (with the exception of the Inland Empire Frame 7H demonstration turbines addressed above). The results of this comparison are summarized in Table 1 below.⁷⁵

validated, the long development cycle needed for these turbines—from first firing through commercialization—becomes evident.”).

⁷³ Memorandum, *Inland Empire Energy Center Power Project (01-AFC-17C) Staff Analysis Of Proposed Modifications To Change To GE 107H Combined-Cycle Systems, Increase Generation and Add Additional Laydown Areas*, From Connie Bruins, CEC Compliance Division Manager, to Interested Parties (Jun. 8, 2005) (hereinafter “Inland Empire Energy Center Staff Analysis Memorandum”), at p. iii. (available at: www.energy.ca.gov/sitingcases/inlandempire/compliance/2005-06-10_FINAL_ANALYSIS.PDF.) The Commission staff also observed that “as with any emerging technology, the proposed project involves a heightened risk of underperformance.” (*Id.* at p. 2.)

⁷⁴ The Air District also examined Siemens technology in addition to GE. Siemens is also developing an H-Class product, but it is farther behind than GE. Siemens has installed a 50 Hz test project in Irsching, Germany, but it is currently validating the turbine in simple-cycle mode, with build-out of a combined-cycle configuration not planned until 2009-2011. (See Frank J. Bartos P.E., *Largest Gas Turbine: 2,838 Sensors, 90 GB Data Per Hour of Testing* Control Engineering, (February 13, 2009) (available at www.controleng.com/article/ca6637328.html?nid=2488&rid=1768760.) Siemens does not yet have a 60-Hz application installed anywhere in the world.

⁷⁵ The information in Table 1 was taken from documents on the Energy Commission’s website at www.energy.ca.gov.

Table 1: Comparison of Thermal Efficiency of Similar Combined-Cycle Power Plants

Facility	CEC Application Date	Facility Size (MW)	Thermal Efficiency (LHV)
Colusa Generation Station	11/6/2006	660	56%
Blythe Energy Project Phase II	2/19/2002	520	55-58% (est.)
Lodi Energy Center	9/10/2008	255	55.6%
CPV Vaca Station Power Plant	11/18/2008	660	55%
Victorville 2 Hybrid Power Project	2/28/2007	563	52.7% (w/ duct burn) 59.0% (thermal solar)
Avenal Energy Power Plant ⁷⁶	2/21/2008	600	50.5%
Palomar Energy Project	8/2003	550	55.3% (w/o duct firing) 54.2% (w/ duct firing)
SMUD Consumnes Phase I	9/13/2001	500	55.1%

For all of these reasons, the Air District has determined that the 56.4% thermal efficiency proposed for the Russell City Energy Center is the best efficiency performance achievable from commercially available systems for a 600 MW combined-cycle power plant.

The Air District published this revised analysis of what equipment constitutes the most efficient for this type of facility in its August 2009 Additional Statement of Basis, and received little further comment. One comment the District did receive questioned how long ago the existing facilities that the Air District examined in its initial analysis of BACT technology for greenhouse gases were built. The Air District disagrees that the age of the facilities it evaluated is relevant to the BACT analysis. A rigorous BACT analysis should consider any and all similar facilities regardless of age to identify the best emissions performance that is being achieved. One generally assumes that newer facilities will have lower emissions, but it could certainly be possible that an older facility actually performs better. In such a case, it would be appropriate to base a BACT limit on the emissions performance achieved by the older facility. The Air District therefore disagrees that the age of the facilities it reviewed is relevant. What matters is that the District identified the best emissions performance currently achievable. This comment does not provide any suggestion that the Air District did not properly do so, as it did not identify any newer or cleaner facility that was omitted from the District's analysis. The Air District remains confident that its BACT analysis reflects the best performance achievable today by current, state-of-the-art generating equipment.

⁷⁶ With respect to Avenal, one commenter stated that this proposed facility would be able to achieve a CO₂ emissions rate of 499.7 lb/MW-hr, but its calculation was based on estimated emissions at 50% load ("Case 12" in the table referenced by the commenter). At full load, emissions would be over 900 lb/MW-hr (using "Case 1") and a nominal power output of 600 MW based on the documentation cited by this commenter.

C. Expression of Greenhouse Gas BACT Emissions Limits In Permit Conditions

Comment III.C.1. – Evaluation of BACT Emissions Performance Standard for Combined-Cycle Combustion Turbines:

The Air District initially proposed to establish an 1100 lb/MW-hr greenhouse gas BACT standard based on the most stringent regulatory mandates that have so far been adopted for electrical generation. (See Statement of Basis at pp. 58-59.) The District received a number of comments during the first comment period that criticized the use of this 1100 lb/MW-hr standard as a BACT limit. These comments raised a number of related points in this regard.

- *Linkage Between lb/MW-hr CO₂ Emission Rates and Thermal Efficiency:* Some comments questioned the District's analysis of the range of lb/MW-hr CO₂ emissions performance levels among various turbines in the context of thermal efficiency. These comments referred to the fact that the BACT technology analysis was explained in terms of turbine thermal efficiency; yet when selecting the BACT performance level BACT was stated in terms of mass emissions per unit of power output. The comments stated that the District had not explained how the range of turbine thermal efficiency percentages evaluated relates to the range of lb/MW-hr CO₂ emissions levels (although they stated that they presumed that the higher lb/MW-hr CO₂ emissions levels correspond to the less efficient turbines).
- *Use of Emissions Standard from SB 1368:* Comments also noted that the proposed 1100 lb/MW-hr permit limit was taken from SB 1368, and that it was developed in that context to accommodate existing facilities with older, higher-emitting equipment as well as new plants. These comments claimed that this number can therefore at most be a floor for setting a BACT limit, and that it is not a measure of the best achievable performance. The comments also claimed that the number was intended to apply to facilities state-wide, and it is not a case-specific determination of what a particular facility can achieve as required by BACT.
- *Data Showing Achievable Emissions ~800 lb/MW-hr:* The comments stated that emissions data from new turbines show that current equipment should be able to achieve emissions as low as 800 lb/MW-hr, and one cited a CEC paper stating that 800 lbs CO₂/MW-hr is an emissions rate that the most efficient modern combustion turbine combined cycle plant can achieve. The comments contended that the BACT limit should be set no higher than this 800 lb/MW-hr level. Comments also stated that the District should look at the best achievable performance level of all turbines, including new turbines, and not limit its review to turbines that were built several years ago. Comments also claimed that the District considered emissions data from only one year of operation from only two facilities, and should conduct a broader review.
- *Justification For Compliance Margin:* The comments also criticized the District's claim that the BACT limit should be set at 1100 lb/MW-hr limit in order to provide a compliance margin. These comments noted that 1100 lb/MW-hr is significantly higher than the emissions measured from the comparable facilities that the District examined (Metcalf and Delta). They asserted that the District should explain in more detail the need for a compliance margin and also the necessary magnitude of the margin. They claimed that the District should explain what foreseeable operating conditions might affect emissions performance, and provide data showing how much of a compliance

margin these conditions would warrant. One comment suggested that the District should also consider a multi-tiered limit that would apply differently to different operating conditions.

- *Justification for Heat Input Limit:* One comment framed its objection in terms of the heat input limit that the District derived from the 1100 lb/MW-hr emissions rate. The comment noted that the corresponding heat input rate the District used as a BACT limit – 2944.3 MMBtu/hr – is 35% higher than the rated maximum for the proposed turbines. The comment objected that this approach would allow turbines with a much lower efficiency than the 55.8% level achievable by these turbines. The comment claimed that this limit has no connection to actual emission rates achievable by such sources.
- *“Output-Based” Limit to Address Efficiency Changes Over Time:* Several comments objected to the District’s proposal to express the BACT limit for greenhouse gases only as a limit on turbine heat input. These comments claimed that instead of limiting heat input, the District should impose a limit on the mass of CO₂ emitted per MW-hr directly. The comments claimed that if the limit is imposed on heat input only, emissions on a lb/MW-hr basis could rise if turbine efficiency declines because of maintenance issues, equipment modifications, or other reasons. One comment cited the *Steel Dynamics* EAB decision for the proposition that a BACT limit needs to ensure compliance on a continual basis over all levels of operation.

Response: In response to these comments, the Air District reevaluated the BACT emissions limits it initially proposed, and upon further consideration agrees that 1100 lb/MW-hr would not be an appropriate BACT limit for greenhouse gas emissions. Instead, the Air District is imposing a lower BACT emissions limit for greenhouse gases in the permit, and is also imposing an “output-based” requirement for periodic compliance testing to ensure that the plant maintains the BACT efficiency standard over time.⁷⁷ In particular, the Air District has adjusted its BACT determination in response to the comments it received as follows.

- First, the Air District has focused its analysis of what emissions performance is achievable by generating equipment with a thermal efficiency at a BACT level of 56.4%. The Air District agrees with the comment that simply looking at lb/MW-hr numbers reported in the ARB database does not necessarily tie the analysis into thermal efficiency, which is the basis for the District’s BACT analysis. Tying the analysis of the achievable numerical BACT emissions limitation to specific data about expected turbine performance is intended to address this issue. As explained below, for purposes of establishing an enforceable numerical efficiency limit, the Air District has used heat input per unit of power output (in MMBtu/kWhr) as the appropriate metric for establishing the BACT limit because the objective, industry-standard method for measuring efficiency uses that metric.

⁷⁷ The Air District published its further analysis and its revised BACT limits in its August 2009 Additional Statement of Basis and revised draft permit. The Air District did not receive any comments providing any reason why this revised approach would not be appropriate under the PSD BACT requirements, and so the Air District is finalizing the BACT limits essentially as proposed in August of 2009. The District is responding to all of the comments from both the first and second comment periods in this document.

- Second, the Air District agrees that using the 1100 lb/MW-hr number established for purposes of SB 1368 as a performance standard for all turbines does not necessarily capture the best performance achievable by the most efficient turbines available for use in new projects, on which a BACT analysis should be based. Instead, the District has analyzed the greenhouse gas emissions that can be achieved by state-of-the-art FD3 class turbines, as noted above. The Air District has determined that the BACT emissions rate should be based upon a best achievable design base heat rate of 6852 Btu/kWhr (which is approximately equivalent to an emissions rate of 792-815 lb/MW-hr, depending on which emissions factor is used), with a reasonable compliance margin of a little over 12% to account for various factors that may make the best design performance unachievable during all operating scenarios over the life of the equipment. This compliance margin is based on a thorough analysis the various elements of turbine operation that may reduce turbine efficiency over time and thereby increase greenhouse gas emissions per unit of power output, as discussed in detail below.
- Third, the Air District agrees that the BACT limit as expressed in the permit needs to be “output based”, instead of just limiting greenhouse gas emissions limits, in order to take into account the potential that maintenance issues or other concerns may lead to declining efficiency. The Air District is therefore requiring both mass emissions limits based on the amount of greenhouse gas emissions expected for combined-cycle turbines with this level of thermal efficiency, plus periodic compliance tests to ensure that the efficiency remains within the established BACT levels. The Air District is basing the efficiency compliance test on an ASTM standard that measures heat rate per power output, because it is a well-accepted engineering standard with objectively-defined measurement standards.

By adjusting its approach to the greenhouse gas BACT issue in this way, the Air District is imposing BACT permit limits that are based on the best achievable thermal efficiency performance of available equipment, with a reasonable and documented compliance margin to make sure the limits are as stringent as possible and still achievable across all operating scenarios. This revised approach also includes continuous short-term and long-term emissions monitoring as well as periodic efficiency monitoring to ensure that BACT performance does not unreasonably degrade over time because of maintenance lapses or similar concerns.

The District’s detailed analysis in each of these areas in response to these comments is set forth below.

1. Conceptual Overview of Proposed Numerical Greenhouse Gas BACT Limits

The Air District is finalizing the Federal PSD Permit with two interrelated numerical BACT emissions limits for greenhouse gases. First, based on the Air District’s technological analysis outlined above and in the District’s two Statement of Basis documents, the Air District is imposing numerical greenhouse gas mass emissions limits based on the emissions expected from the state-of-the-art FD3 generating equipment. The mass emissions limits are based on the maximum rated heat input capacity of the combustion turbines and HRSG duct burners needed to produce the power generation demand that the facility has been designed to serve. Every unit of heat input generates a known amount of greenhouse gas emissions, and so the Air District is

imposing greenhouse gas mass emissions limits based on this heat input capacity, on an hourly, daily, and annual basis. The heat input and greenhouse gas emissions limits the Air District is imposing are set forth in Table 2 below.

Table 2 - Heat Input and Greenhouse Gas Emissions Limit Summary

Averaging Period	Heat Input Limit (MMBtu)	Greenhouse Gas Emissions Limits (metric tons CO ₂ E)			
		CO ₂	CH ₄	N ₂ O	CO ₂ E
1-Hour	4,477.2	242	0.08	0.14	242
24-Hour	107,452.0	5,797	2.03	3.33	5,802
Annual	35,708,858.0	1,926,399	675	1,107.48	1,928,182

These heat input and mass emissions limits ensure that the facility’s turbines and HRSG duct burners will not use any more natural gas, and not have any more greenhouse gas emissions, than the Air District has determined is necessary to meet the design power generation capacity. As described in detail below, the heat input and greenhouse gas emissions will be monitored in real time using natural gas usage information, which provides a very accurate indication of these parameters.

Second, the District is also imposing an “output-based” efficiency limit that takes into account the amount of power generated by the facility, in order to address the concern raised in comments that simply specifying maximum heat input and corresponding greenhouse gas output limits fails to address the potential that turbine efficiency may decline to the point where it no longer reflects BACT. The District is therefore imposing a minimum turbine efficiency requirement, expressed as MMBtu of heat input per megawatt of power output, that the facility will be required to achieve. The facility will be required to conduct annual compliance tests in which heat input and power output are measured to a high degree of accuracy, and will be required to ensure that gas turbine heat input remains below 7,730 Btu/kWhr (HHV), a rate equivalent to generating a minimum of one megawatt of power per 7.73 MMBtu of natural gas burned.

The District is imposing this 7,730 Btu/kWhr (HHV) efficiency limit as the lowest heat input rate that can be reasonably assured under all operating scenarios. As outlined below, the limit is based upon the design efficiency of the 56.4% thermally-efficient FD3-equivalent combustion turbines⁷⁸ that the Air District has concluded are the BACT technology for a nominal 600-megawatt natural-gas fired combined-cycle electrical generating facility. This value, known as the “Design Base Heat Rate” for the facility, is 6,852 Btu/KW-hr (HHV), and reflects the thermal efficiency that the facility is designed for. To ensure that the numerical BACT efficiency limit reflects a reasonable margin of compliance, the District has evaluated the factors that could reasonably be expected to degrade the theoretical design efficiency of the turbines and increase the heat rate (*i.e.*, cause more fuel to be required to produce a megawatt of power). The Air District has considered a number of factors in this regard as explained in detail below, including (i) a reasonable design margin of 3.3% to reflect that the equipment as actually

⁷⁸ The combustion turbine equipment on which the BACT heat rate analysis was based included the FD3 upgrades discussed above.

constructed and installed may not fully achieve the assumptions that went into the design calculations; (ii) a reasonable performance degradation margin of 6% to reflect reduced efficiency from normal wear and tear on the equipment between major maintenance overhauls; and (iii) an additional 3% degradation margin based on additional wear and tear caused by variability in the operation of the auxiliary plant equipment that will be powered by the turbines, including the natural gas compressors and water recycling system. These potential degradation factors are an unavoidable aspect of building and operating the facility, consistent with best engineering practices, and the ultimate BACT limit needs to account for them to ensure that it is achievable over all operating scenarios. Applying these potential degradation factors to the Design Base Heat Rate, the Air District has concluded that the appropriate numerical Greenhouse Gas BACT heat input efficiency limit for this equipment is 7,730 Btu/kWhr (HHV). The Air District is imposing this limit as an enforceable not-to-exceed permit limit, along with appropriate monitoring and requirements.

In conducting this analysis, the Air District has also been mindful that under normal circumstances the establishment of a numerical BACT permit limit would often involve a review of permit limits imposed at other facilities and of compliance monitoring data required under such permits. In this case, however, no facility the Air District is aware of has ever been subject to an enforceable BACT limit on its emissions of greenhouse gases; nor has any facility, to the Air District's knowledge, been subject to an enforceable limitation on its efficiency (heat rate per kW-hr of power output). Because this represents a "first of its kind" limitation in an air permit, there is little relevant performance data which might provide a basis for concluding that a lower Heat Rate Limit can consistently be met over time. The Air District is therefore using this approach based on reasonable technical assumptions of what the facility can achieve, rather than on actual permit limits or compliance monitoring data from other similar facilities. An enforceable BACT limitation must be set at a level that the facility can achieve for the life of the facility, including as its equipment ages and incurs anticipated degradation. At the same time, the Heat Rate Limit the Air District is imposing is stringent enough to ensure that the facility operator will not be able to allow the equipment to incur undue efficiency degradation through deferral of necessary maintenance such that the assumptions which supported this BACT determination are no longer valid.

2. Derivation of Numerical Greenhouse Gas BACT Limits

Greenhouse Gas Mass Emissions Limits: The Air District calculated the appropriate heat-rate limit and mass emissions rate limits using the maximum heat input capacity of gas turbines and duct burners combined (*i.e.*, maximum plant capacity). The facility's maximum heat input capacity is 4,477.2 MMBtu per hour; 107,452.0 MMBtu/day; and 35,708,858.0 per year. (*See* Proposed Permit Conditions 13, 14 & 15.) The Air District then calculated corresponding mass emissions rates for CO₂, CH₄, N₂O, and CO₂E using established emissions factors. For CO₂, emissions were calculated using the CO₂ emissions factor of 118.9 lbs/MMBtu, as required under EPA's Acid Rain Trading Program, 40 C.F.R. Part 75. For CH₄ and N₂O, emissions were calculated using the Air Resources Board's emissions factors of 0.0020 and 0.00022 lb/MMBtu, respectively. CO₂E was calculated by applying a global warming potential multiplier of 21 and 310 for CH₄ and N₂O, respectively, based upon the Air Resources Board's mandatory reporting

rule.⁷⁹ The associated mass emissions limits are outlined in Table 2 above on an hourly, daily and annual basis.

Heat Rate Efficiency Limit: To determine the appropriate heat-input efficiency limit, the Air District started with the turbines' Design Base Heat Rate⁸⁰ and then calculated a reasonable compliance margin based upon reasonable degradation factors that may foreseeably reduce efficiency under real-world conditions as noted above.

- ***Net Design Base Heat Rate – 6,852 Btu/kWhr:***

The turbines' Design Base Heat Rate is 6,852 Btu/kWhr (HHV), based on operation of both combustion turbines with no duct firing, corrected to ISO conditions.⁸¹ (For comparison with a pounds-per-megawatt-hour efficiency rating, this is between 792.9 and 815.5 lbs/MWhr, depending upon which CO₂ emissions factor is applied.⁸²) This represents what the plant (at the design stage) is expected to achieve when it is new and clean; it does not represent what it will achieve over time as the equipment incurs degradation between major maintenance overhauls. It also does not represent the equipment manufacturer's guaranteed levels of performance.

Note that this Design Base Heat Rate of 6,852 Btu/kWhr (HHV) without duct firing and 6,970 Btu/kWhr (HHV) with duct firing reflects the facility's "net" power production, meaning the denominator is the amount of power provided to the grid; it does not reflect the total amount of energy produced by the plant, which also includes auxiliary load consumed by operation of the plant.⁸³ The total auxiliary load for this facility is 21.1 MW without duct firing or 24 MW with

⁷⁹ The Air District would also note that it is following the convention of stating emissions of greenhouse gases in terms of "CO₂-equivalents" (CO₂E), which, for this source, include emissions of methane (CH₄) and nitrous oxide (N₂O) as well. These two pollutants have a higher "global warming potential" than CO₂, reflecting their relative propensity to trap solar radiation within the Earth's atmosphere that would otherwise be reflected back into outer space and thereby contribute to global warming. The emissions factors and global warming potentials for N₂O and CH₄ are specified by the Air Resources Board's mandatory reporting rule.

⁸⁰ Electric generating facilities typically measure their efficiency in terms of the "heat rate", which is the energy content of the fuel, in British thermal units (Btu), that it takes to generate a kilowatt-hour (kW-hr) of electric power to the grid.

⁸¹ Russell City Energy Center Heat Balance Diagrams.

⁸² The lower and higher figure reflect application of the emissions factors for CO₂ applicable under U.S. EPA's Climate Leaders program – 115.6 lb/MMBtu – and the Part 75 Acid Rain Monitoring Program, 118.9 lb/MMBtu. Other relevant emissions factors include the California Climate Action Registry's factor of 116.9 lb/MMBtu and the Air Resources Board's mandatory reporting rule, which applies emissions factors for CO₂ between 116.5 and 120.5 lb/MMBtu of natural gas, depending upon the Btu content of the gas stream.

⁸³ This auxiliary load includes power for the facility's recycling of wastewater from the adjacent City of Hayward's wastewater treatment plant. This system will recycle roughly 4 million gallons of water a day in the facility's operations instead of having to obtain it from other sources; and will use a "Zero Liquid Discharge" system so that none of that wastewater will be discharged to the Bay. The facility also will include a "Low Noise/Plume-Abated" cooling

duct firing.⁸⁴ Accounting for this auxiliary load would result in a “gross” Design Base Heat Rate of 6,743 Btu/kWhr (HHV) when duct firing is not occurring, which would result in emissions between 780.3 and 802.5 lbs/MW-hr of CO₂E, depending upon which emissions factor is applied for CO₂. When duct firing is occurring, the “gross” Design Base Heat Rate would be 6,868 Btu/kWhr (HHV), or between 794.7 and 817.4 lbs/MWhr of CO₂E.

- ***Installed Design Base Heat Rate – 7,080 Btu/kWhr:***

While the Design Rate Heat Rate reflects what the engineers aim to achieve in designing the facility, design and construction of a combined-cycle power plant involves many assumptions about anticipated performance of the many elements of the plant, which are often imprecise or not reflective of conditions once installed at the site. As a consequence, the facility also calculates an “Installed Base Heat Rate”, which represents a design margin of 3.3% to address such items as equipment underperformance and short-term degradation. According to information provided by the Applicant, a design margin of up to 5% is typical in the commercial terms for the engineering, procurement and construction contracts for a combined-cycle power plant. Normally the performance guarantees from the combustion and steam turbine original equipment manufacturers and the contractual terms require demonstration that the project, as constructed, achieves the design output and heat rate, subject to a plus or minus 5% margin. For example, if the tested output is more than 95% of the guaranteed output, or the tested heat rate is less than 105% of guaranteed heat rate, the original equipment manufacturer and engineering, procurement and construction contractor can declare substantial completion and pay liquidated damages to compensate for the performance shortfalls. The design margin also reflects some tolerance for uncertainties associated with the plant’s auxiliary load – such as the potential variance between assumptions about the amount of load that will be required to conduct treatment and evaporation of the City’s waste water within the facility – and actual experience. Adding this 3.3% design margin to the Design Base Heat Rate results in an Installed Base Heat Rate of 7,080 Btu/kWhr (HHV), assuming dual unit operation without duct burner firing, corrected to ISO conditions.

- ***Degraded Base Heat Rate – 7,730 Btu/kWhr:***

To establish an enforceable BACT condition that can be achieved over the life of the facility, the Air District also must account for anticipated degradation of the equipment over time between regular maintenance cycles.

For the gas turbines, the Air District is basing its analysis on a 48,000-operating-hour degradation curve provided by Siemens, which reflects anticipated recoverable and non-recoverable degradation in heat rate between major maintenance overhauls of approximately 5.2%.⁸⁵ According to combustion turbine manufacturers, anticipated degradation in heat rate of

tower, which will consume additional load due to use of recycled waste water. These are important environmentally beneficial aspects of the project.

⁸⁴ See Russell City Energy Center Heat Balance Diagrams.

⁸⁵ Siemens Power Generation, Inc, *Guiding Principles for Conducting Site Performance Tests on Siemens Industrial Gas Turbine-Generator Units*, EC-93208-R10, July 15, 2008, Figure 3 “Degradation Effect on Gas Turbine Heat Rate” TT-DEG-76.

the gas turbines alone can be expected to increase non-linearly over time. The degradation curves relied upon in this analysis describe the amount of “recoverable” and “non-recoverable” degradation. The former includes degradation that can be recovered through compressor water washing, filter changes, instrumentation calibration, and auxiliary equipment maintenance. The latter includes degradation that cannot be restored upon a maintenance overhaul.

The 48,000-hour maintenance interval is based upon Siemens’ recommendations, which provide detailed formulae for determining when the equipment should undergo certain inspection and maintenance activities, based upon the accumulated total for both “Equivalent Baseload Hours” and “Equivalent Starts”.⁸⁶ By calculating Equivalent Baseload Hours and Equivalent Starts, the facility operator accounts for the specific operating conditions and events experienced by the facility that may impact the equipment’s performance. These include the difference between baseload and peak firing hours and the impacts caused by instantaneous load changes (*i.e.*, outside of the expected ramp rate).

The original equipment manufacturer’s degradation curves only account for anticipated degradation within the first 48,000 hours of the gas turbine’s useful life; they do not reflect any potential increase in this rate which might be expected after the first major overhaul and/or as the equipment approaches the end of its useful life. Further, because the projected 5.2% degradation rate represents the *average*, and not the maximum or guaranteed, rate of degradation for the gas turbines, the Air District has determined that, for purposes of deriving an enforceable BACT limitation on the proposed facility’s heat rate, gas turbine degradation may reasonably be estimated at 6% of the facility’s heat rate. A slightly higher than average expected degradation is justified for purposes of developing an enforceable emissions limit here, given the limited operational experience of the new FD3-level turbine technology. Adding this 6% degradation factor to the facility’s “Installed Base Heat Rate” of 7,080 Btu/kWhr (HHV) (*i.e.*, the projected heat rate of the equipment in its original condition, after accounting for a predicted 3.3% design margin) results in a potential heat rate of 7,505 Btu/kWhr (HHV) (without duct firing).

Finally, in addition to the heat rate degradation from normal wear and tear on the turbines, the Air District is also providing a reasonable compliance margin based on potential degradation in other elements of the combined cycle plant that would cause the overall plant heat rate to rise (*i.e.*, cause efficiency to fall). These other elements include the following:

- *Variability in Natural Gas Pressure:* The facility needs to bring the natural gas burned in the turbines up to a pressure of 500 psi, and uses gas compressors to do so because the natural gas supplied to the facility is delivered at a lower pressure. According to data from PG&E, the natural gas supplier, the delivery pressure may fluctuate between 170 and 355 psi (or between 250 and 410 psi with upgrades to the natural gas line).⁸⁷ Because of the variability in delivery pressure, the gas compressor engines may have to cycle up and down, which can

⁸⁶ Siemens Power Generation, Inc., Service Bulletin 36803, *Combustion Turbine Maintenance and Inspection Intervals*, Revision No. 10, October 7, 2004.

⁸⁷ Letter, Rodney Boschee, Pacific Gas & Electric, Wholesale Marketing & Business Development, to Chris Delaney, CPN Pipeline Company, subject: Calpine Russell City Energy Center, December 2, 2008.

result in increased wear and tear on the engine and decreased fuel efficiency. This would increase auxiliary load on the facility and reduce overall plant efficiency.

- *Variability in Natural Gas Quality:* In addition to changes in natural gas pressure, the gas supply for the facility may also experience substantial variation in the quality of the natural gas (in terms of its chemical constituents). This can further exacerbate degradation of the gas turbines, in the same way that using low-quality gasoline can affect an automobile's performance.
- *Variability in Cooling Water Quality:* The facility's water recycling system will treat approximately 4 million gallons per day of waste water from the City of Hayward's adjacent treatment plant for use in the plant's operations. Data from the water treatment plant shows a substantial degree of variability in the water quality, which in some cases may require additional recycling of the water supply prior to its use by the facility.⁸⁸ The additional recycling would require greater load to conduct such treatment and could result in accelerated degradation of various components of the water treatment system, including pumps and rotating equipment. The same is true of the evaporator and Zero Liquid Discharge system, as well as of the plume-abated cooling towers.
- *Degradation in Turbine Exhaust Flow:* The gas turbine manufacturer's degradation curves predict potential recoverable and non-recoverable degradation in gas turbine exhaust flow of 3.75% over the 48,000 hour maintenance cycle.⁸⁹ This degradation in exhaust flow will result in a direct reduction in the ability of the steam turbine to generate power, which will further degrade the plant's overall efficiency. While degradation in the exhaust flow is expected to be partially offset by degradation in exhaust temperature (which rises over the maintenance cycle)⁹⁰, this offset will not make up for anticipated degradation in the reduction in steam turbine power as a result of reduced exhaust flow.
- *Degradation in Steam Turbine Performance:* Degradation in the performance of the heat recovery boilers and steam turbine is also expected to occur over the course of a major maintenance cycle.
- *Degradation in Gas Turbine Performance:* The influence of the bay-side environment on the air inlet filter may cause inlet air pressure to be reduced, which would further degrade the performance of the gas turbines.

The Air District found little documentation on which to base a specific numerical estimate of exactly what the efficiency impacts would be from these affects, in part because regulatory agencies have not had to undertake analyses in this area before. Without usable precedents or documentation regarding the precise potential for degradation from these issues, the Air District has used its best engineering judgment to assess how much additional degradation should be

⁸⁸ See City of Hayward Wastewater Treatment Plant water monitoring data, November 1, 2008 – March 20, 2009; Summary data, *Reclaimed Water Project-2008, Final Clarifier* for sample dated April 16, 2008.

⁸⁹ Siemens Power Generation, Inc, *Guiding Principles for Conducting Site Performance Tests on Siemens Industrial Gas Turbine-Generator Units*, EC-93208-R10, July 15, 2008, Figure 4 "Degradation Effect on Gas Turbine Exhaust Flow," TT-DEG-77.

⁹⁰ *Id.*, EC-93208-R10, July 15, 2008, Figure 5, "Degradation Effect on Gas Turbine Exhaust Temperature" TT-DEG-78.

anticipated. The Air District believes in its engineering judgment that an additional 3% degradation is a reasonable and appropriate estimate under the circumstances, taking into account the fact that the limits being imposed based on this estimate will be enforceable, not-to-exceed permit conditions.

The Air District published this analysis and its proposed turbine efficiency standard for the facility in the Additional Statement of Basis and invited further review and comment from the public. The Air District received comments during the second comment period noting that for the greenhouse gas BACT determination, the District is allowing a compliance margin of approximately 9% above the design efficiency of the proposed facility. The comments questioned the basis for this compliance margin. In response to this comment, the Air District refers to the analysis outlined above explaining how its compliance margin was derived. The Air District determined that a 3.3% design margin was appropriate to account for uncertainties associated with how the plant will function as actually constructed, compared with its design on paper. The Air District then determined that a further 6% degradation margin was appropriate to take into account the normal decline in efficiency that occurs over the life of the equipment between maintenance intervals. The Air District then determined that a further 3% margin was appropriate to account for potential degradation associated with various uncertainties regarding facility operation, such as variation in natural gas pressure and quality, variability in cooling water quality, and so forth. The Air District notes that the comments did not point to anything specific in this analysis that they suggested was inappropriate. Based on this analysis, the Air District believes that the plant efficiency standard it derived is the most stringent standard that the facility will reasonably be able to achieve during all anticipated operations.

3. Implementation of Numerical Greenhouse Gas BACT Limits In Permit Conditions

Finally, the Air District is implementing these greenhouse gas BACT limits as enforceable permit conditions, with appropriate monitoring and recordkeeping. For the heat-input and GHG mass emissions limits, the facility will be required to demonstrate compliance by monitoring its fuel usage on a real-time basis, and then calculating heat-input and mass emissions based on the fuel usage. For CO₂, mass emissions will be calculated using the CO₂ emissions factor of 118.9 lbs/MMBtu, as required under EPA's Acid Rain Trading Program, 40 C.F.R. Part 75. For CH₄ and N₂O, mass emissions will be calculated using the Air Resources Board's emissions factors of 0.0020 and 0.00022 lb/MMBtu, respectively. CO₂E would be calculated by multiplying CH₄ and N₂O emissions by their respective global warming potentials of 21 and 310, based upon the Air Resources Board's mandatory reporting rule, and then adding them to CO₂ emissions.⁹¹ The facility will be required to maintain records of its heat input and mass emissions monitoring data in order to ensure compliance.

⁹¹ For purposes of assuring consistency with existing reporting regimes for greenhouse gas emissions, it makes best sense to align monitoring and reporting requirements in the Federal PSD Permit with these prevailing methods for calculation and inventorying of greenhouse gas emissions.

For the turbine efficiency limit (the 7,730 Btu/kWhr heat-rate limit), the Air District is requiring compliance testing to demonstrate compliance within 90 days after the end of the commissioning period (as defined in the permit) and annually thereafter to ensure that efficiency is maintained at a BACT level. Under this periodic compliance test requirement, the facility will be required to perform a “Heat Rate Performance Test” using the industry-accepted method for heat rate and capacity testing, the American Society of Mechanical Engineers (ASME) Performance Test Code on Overall Plant Performance (ASME PTC 46-1996)). This test includes objective parameters that will ensure consistent and reliable reporting of actual turbine efficiency, and it is the accepted industry standard test for this purpose. The facility will be required to conduct the test at baseload (*i.e.*, full capacity), without duct firing. The facility will be required to submit a test plan to the Air District for its review and approval at least thirty (30) days in advance of the proposed test. The test will consist of three one-hour test runs, and the results of each test run will be averaged and then corrected back to ISO conditions of:

- Ambient Dry Bulb Temperature: 59°F
- Ambient Relative Humidity: 60%
- Barometric Pressure: 14.69 psia
- Fuel Lower Heating Value: 20,866 Btu/lb
- Fuel HHV/LHV Ratio: 1.1099

To determine compliance with this condition, the result of this test will be compared to the Heat Rate Limit of 7,730 Btu/kWhr (HHV).

These compliance monitoring requirements will ensure compliance with the greenhouse gas limits in the permit. The Air District also considered whether to require the facility to use a Continuous Emissions Monitor (CEM) to measure greenhouse gas emissions directly (as CO₂), but concluded that calculating emissions from heat input is preferable. Unlike some other pollutants such as NO_x or carbon monoxide whose formation is heavily dependent on conditions of combustion and/or performance of add-on emissions controls, greenhouse gases are a direct and unavoidable byproduct of the combustion process. The amount of carbon within the fuel will all ultimately be emitted as greenhouse gases in a manner that is easily determined using well-established emissions factors. One can therefore determine with great accuracy what greenhouse gases are being emitted by measuring the amount of hydrocarbon fuel being burned (measured as heat input). For this reason, the test methods for measuring heat rate and capacity can achieve an accuracy of ±1.5%,⁹² which is better than the relative accuracy of CEMs which typically ranges as high as ±10%.⁹³ The Air District is therefore requiring surrogate monitoring for greenhouse gas emissions using heat rate instead of a CEM.

The Air District also considered whether it would be possible to monitor thermal efficiency on a continuous basis in terms of emissions (or heat input) per unit of power output, but found that it

⁹² American Society of Mechanical Engineers (ASME), *Performance Test Code on Overall Plant Performance*, (PTC 46-1996), December 15, 1997, Table 1.1, “Largest Expected Test Uncertainties”, at p. 4 (providing 1.5% variance in the corrected heat rate for “combined gas turbine and steam turbine cycles with or without supplemental firing to steam generator”).

⁹³ See, e.g., 40 C.F.R. Part 75, Appendix A, § 3.3.3 (“The relative accuracy for CO₂ and O₂ monitors shall not exceed 10.0 percent.”).

would not be feasible to measure efficiency in this manner on a continual basis in any meaningful way. Measuring efficiency with a high degree of accuracy requires expertly-administered test procedures as set forth in the ASME PTC 46 standard, and it is not feasible to require this testing methodology to be implemented at all times of facility operation. Moreover, measuring efficiency by comparing heat input to power output would not be feasible during periods such as startup, shutdown, or tuning when no power is being produced for the grid. There will be heat input during this period, but with no power output the denominator in the pounds-per-megawatt-hour efficiency measurement will be zero. And finally, thermal efficiency is unlikely to experience major ups and downs over time. Unlike NO_x or CO, which could fall out of compliance rapidly if good combustion conditions are not maintained or if an add-on control device fails, thermal efficiency is likely to degrade relatively slowly over time.⁹⁴ A one-day snapshot of turbine efficiency from a periodic compliance test is therefore likely to be relatively representative of efficiency over a longer time frame. For all of these reasons, the Air District is requiring demonstration of compliance with the heat rate BACT limit through a periodic compliance test, not continuous monitoring. The Air District is imposing an annual test requirement, which is the typical test frequency the District requires in periodic monitoring situations such as this. Based on the performance degradation documentation the Air District has reviewed, annual compliance testing is an appropriate testing frequency for this type of permit limit.

D. Greenhouse Gas BACT Analysis for Other Equipment

Comment III.D.1. – Greenhouse Gas Emissions from Emergency Firepump Diesel Engine and Circuit Breakers:

The Air District received comments stating that it should undertake a BACT analysis for greenhouse gas emissions from other equipment at the facility, such as the emergency backup diesel generator and the circuit breakers which the comments stated use SF₆, a greenhouse gas.

Response: The Air District disagrees that a BACT analysis for greenhouse gas emissions for these sources is required by the Federal PSD Regulations. As noted above, EPA has made clear that greenhouse gases are not “subject to regulation” (at least not at this point in time), and so they are not subject to Federal PSD Review as a legal matter. That said, the Applicant has voluntarily requested that the Air District conduct a BACT review of greenhouse gas issues and has agreed to take voluntary greenhouse gas BACT limits imposed by the Air District as part of its permit conditions. To the extent that the Air District is conducting a greenhouse gas BACT analysis for the facility voluntarily at the behest of the applicant, the Air District agrees that a comprehensive BACT analysis would have to include all sources of greenhouse gas emissions at the facility. The Air District is therefore including the emergency diesel firepump engine and the circuit breakers in its BACT analysis, and is imposing BACT permit conditions for them, in response to these comments.⁹⁵ The Air District’s response is described below.

⁹⁴ See generally efficiency degradation data cited in footnotes 85, 89 & 90, *supra*.

⁹⁵ The comments also suggested that the Air District should include any natural gas pre-heaters in the BACT analysis. This power plant project does not involve a pre-heater, however, so the Air District disagrees with this element of the comments.

1. Diesel Fire Pump

The emergency diesel firepump engine will have the potential to emit greenhouse gases (CO₂, CH₄, and N₂O) because it will combust a hydrocarbon fuel, just as with the gas turbines and heat recovery boilers. There are no effective combustion controls to reduce the greenhouse gas emissions from hydrocarbon fuel combustion, and there are no currently available post-combustion controls, as the District explained in its greenhouse gas analysis for the gas turbines. The Air District therefore concludes that the only achievable technological approach to reducing greenhouse gases from the firepump engine is to use the most efficient engine that meets the stringent National Fire Protection Association (“NFPA”) standards for reserve horsepower capacity, engine cranking systems, engine cooling systems, fuel types instrumentation and control and exhaust systems. (*See generally* Statement of Basis at pp. 55-56, describing the NFPA requirements.) As there is only one control technology to choose from, application of the 5 steps in the Top-Down BACT analysis results in the selection of that control technology.

The 2100 R.P.M. 300-hp Clarke JW6H-UF40 diesel firepump engine that the applicant has proposed for use here has a fuel consumption rate of 14.0 gallons per hour.⁹⁶ The Air District has reviewed fuel-efficiency data for similarly-sized NFPA-20 certified firepump diesel engines rated at 2100 R.P.M., and has not found any such engines with a higher fuel efficiency.⁹⁷ The Air District has therefore concluded that the 14-gal/hr Clarke engine is the most efficient equipment available, and so it qualifies as the BACT control technology.⁹⁸

The firepump engine may have to be used for up to 50 hours per year for reliability testing and maintenance purposes. Use of the engine at 14 gallons of diesel fuel per hour for up to 50 hours per year would result in total greenhouse gas emissions from the fire pump of 7.6 tons CO₂E per year.⁹⁹ The Air District is therefore imposing a greenhouse gas limit in the permit of 7.6 tons per year of CO₂E as a BACT limit. The facility will be required to demonstrate compliance with this limit by recording fuel usage and using an emissions factor of 21.7 lb/ CO₂E-gal to determine resulting CO₂E emissions.

As with turbine emissions, the Air District considered using a CEM to monitor greenhouse gas emissions directly. But it concluded that determining emissions based on fuel usage as a surrogate is a preferable approach, for similar reasons as with the turbines. Fuel usage can be accurately measured, and the amount of greenhouse gas equivalents can be calculated precisely based on well-established emissions factors.

⁹⁶ *See* Clarke JW6H-UF40 Fire Pump Driver, Emission Data for California ATCM Tier 2, Clarke Fire Protection Products (Rev. E, July 12, 2007), at p.1.

⁹⁷ *Cf.* Cummins CFP11E-F10 Fire Pump Driver, California ATCM Tier 2 Emission Data (Aug. 26, 2008) (fuel consumption rate of 16.0 gal/hr); Deutz DFP6 1013 C25 fire protection engine, EPA Tier 2/CARB Technical Data Sheet (Apr. 2008) (fuel consumption rate 15 gal/hr).

⁹⁸ In the terminology of the “Top-Down” BACT analysis, the Clarke engine at 14.0 gal/hr would be ranked the No. 1 technically feasible control alternative at Step 3 of the analysis. Since the Air District is selecting the top technology, the additional steps in the analysis become moot.

⁹⁹ Unlike emissions of criteria pollutants, it is feasible here to impose a numerical emissions limitation for CO₂E because CO₂E has a direct correlation to fuel usage, which is readily measureable. The emissions factor for diesel fuel is 21.7 pounds of CO₂E per gallon.

The Air District published this greenhouse gas BACT analysis and determination for public review and comment in the Additional Statement of Basis. During the second comment period, the Air District received comments suggesting that it consider whether the diesel firepump could be replaced with an electric firepump in order to reduce greenhouse gas emissions. In response, the Air District observes that the facility's fire protection system will actually include an electric fire pump, which is not a direct source of emissions and therefore not covered by the PSD permit.¹⁰⁰ But the facility also requires a diesel engine as a backup alternative in case the electric pump is not operation, as required by NFPA Standard No. 850 (NFPA-850 Electrical Plant Fire Protection). The NFPA standard requires that where multiple fire pumps are required by the fire risk evaluation, "the pumps should not be subject to a common failure, electrical or mechanical, and should be of sufficient capacity to meet the fire flow requirements determined by 6.2.1 with the largest pump out of service." (NFPA-850, § 6.2.5.1.) To meet this requirement, a power plant typically employs two independent means of powering two full-size pumps. The plant's electrical system powers the primary pump, while a diesel engine is frequently used to drive the second pump. In circumstances where there are two independent sources of electrical power available, two electrical pumps have been used to fulfill this requirement, and no diesel fire pump engine has been required. The proposed facility does not have a separate independent means of power available to meet the secondary power requirements for its fire protection system. Use of an electric fire pump engine to meet both the primary and secondary fire pump requirements is therefore not feasible for the proposed facility. The Air District therefore disagrees with the comment that it should require an electric firepump instead of a diesel engine as BACT. Requiring an electric firepump would impermissibly redefine the source because it would change one of the inherent design elements of the facility's fire safety systems – the ability to use a redundant power source so fire suppression is not solely reliant on electric power. This reason for using a diesel firepump engine instead of an electric motor is directly related to one of the central fundamental purposes of this source, to provide redundant fire suppression capabilities. For these reasons, the Air District disagrees that the choice of firepump motive power should be covered by the BACT analysis. Moreover, even if the Air District were required to analyze the use of an electric firepump under the BACT analysis, it would eliminate it at Step 2 in the top-down BACT analysis as not feasible here given the redundant fire-suppression purpose that this equipment will serve.

2. Circuit Breakers

The facility's circuit breakers will also have the potential to emit a greenhouse gas, sulfur hexafluoride (SF₆). Circuit breakers do not emit SF₆ directly, but they do have the potential for fugitive emissions (leaks).¹⁰¹ The facility will include a switchyard with five circuit breakers, and the applicant has proposed breakers containing approximately 145 pounds of SF₆ each in an

¹⁰⁰ Email from Alex Prusi, PE (Director of Engineering, Calpine) to Dan Ewan (Project Director, Calpine), October 2, 2009.

¹⁰¹ U.S. EPA, J. Blackman (U.S. EPA, Program Manager, SF₆ Emission Reduction Partnership for Electric Power Systems), M. Averyt (ICF Consulting), and Z. Taylor (ICF Consulting), *SF₆ Leak Rates from High Voltage Circuit Breakers – U.S. EPA Investigates Potential Greenhouse Gas Emissions Source*, June 2006, first published in Proceedings of the 2006 IEEE Power Engineering Society General Meeting, Montreal, Quebec, Canada, June 2006, available at: www.epa.gov/electricpower-sf6/documents/leakrates_circuitbreakers.pdf.

enclosed-pressure system.¹⁰² SF₆, a gaseous dielectric used in the breakers, is a highly potent greenhouse gas, with a “global warming potential” over a 100-year period 23,000 times greater than carbon dioxide (CO₂).¹⁰³ Leakage is expected to be minimal, and is expected to occur only as a result of circuit interruption and at extremely low temperatures not anticipated in the Bay Area. Nevertheless, given SF₆’s high global warming potential, even small amounts of leakage can be significant and should be considered for purposes of a greenhouse gas BACT analysis.

STEP 1: Identify Control Technologies for SF₆

Step 1 of the Top-Down BACT analysis is to identify all feasible control technologies. One alternative the Air District has considered is to substitute another, non-greenhouse-gas substance for SF₆ as the dielectric material in the breakers. One alternative to SF₆ would be use of a dielectric oil or compressed air (“air blast”) circuit breaker, which historically were used in high-voltage installations prior to the development of SF₆ breakers. This type of technology is feasible for use here, although SF₆ has become the predominant insulator and arc quenching substance in circuit breakers today because of its superior capabilities.¹⁰⁴

Another alternative the Air District has considered is to use state-of-the-art SF₆ technology with leak detection to limit fugitive emissions. In comparison to older SF₆ circuit breakers, modern breakers are designed as a totally enclosed-pressure system with far lower potential for SF₆ emissions. The best modern equipment can be guaranteed to leak at a rate of no more than 0.5% per year (by weight). In addition, the effectiveness of leak-tight closed systems can be enhanced by equipping them with a density alarm that provides a warning when 10% of the SF₆ (by weight) has escaped. The use of an alarm identifies potential leak problems before the bulk of the SF₆ has escaped, so that it can be addressed proactively in order to prevent further release of the gas.

The Air District also considered the possibility of other emerging technologies that would replace SF₆ with a material that has similar dielectric and arc-quenching properties, but without the drawbacks of oil and air-blast breakers.

STEP 2: Eliminate Technically Infeasible Options

The Air District next examined the technical feasibility of each of the control alternatives identified. Looking at oil or air-blast circuit breakers, the Air District concluded that this

¹⁰² Alstom USA Inc., *Instruction Manual-Type HGF 1012/1014*, HG12IM, Revision 0, Part 1, Page 10, 19.

¹⁰³ Letter, David, Mehl (California Air Resources Board, Manager, Energy Section), *Re: Sulfur Hexafluoride (SF₆) Emissions Survey for the Electricity Sector and Particle Accelerator Operators*, January 13, 2009, available at: www.arb.ca.gov/cc/sf6elec/survey/surveycoverletter.pdf.

¹⁰⁴ See Christophorou, L.G., J.K. Olthoff and D.S. Green, National Institute of Standards and Technology (NIST), Electricity Division (Electronics and Electrical Engineering Laboratory) and Process Measurements Division (Chemical Science and Technology Laboratory), *NIST Technical Note 1425: Gases for Electrical Insulation and Arc Interruption: Possible Present and Future Alternatives to Pure SF₆*, November 1997 (hereinafter, “NIST Technical Note 1425”), available at: www.epa.gov/electricpower-sf6/documents/new_report_final.pdf.

alternative is not technically feasible for this project because it would require significantly larger equipment to replicate the same insulating and arc-quenching capabilities of the SF₆ breakers.¹⁰⁵ The proposed project site does not have adequate space within the switchyard to accommodate oil or air-blast breakers. As previously noted, the project has been proposed for location in a densely populated area because, according to the Energy Commission, the project's objectives were "[t]o locate near centers of demand and key infrastructure, such as transmission line interconnections, supplies of process water (preferably wastewater), and natural gas at competitive prices", and "[t]o serve the electrical power needs of the East Bay, San Francisco Peninsula, and City of San Francisco."¹⁰⁶ As a consequence, replacement of the proposed circuit breakers with breakers that do not use SF₆ is not a feasible option for this Project, given the space constraints imposed by construction of the Project on a former industrial site near a source of recycled waste water.

As for the feasibility of enclosed-pressure SF₆ circuit breakers with leak detection, which are far smaller than oil/air-blast breakers for the same application, they are feasible for this location.

Finally, the Air District also evaluated the technical feasibility of emerging alternatives to SF₆. According to the most recent report released by the EPA SF₆ Partnership, "[n]o clear alternative exists for this gas that is used extensively in circuit breakers, gas-insulated substations, and switch gear, due to its inertness and dielectric properties."¹⁰⁷ Research and development efforts have focused on finding substitutes for SF₆ that have comparable insulating and arc quenching properties in high-voltage applications.¹⁰⁸ While some progress has reportedly been made using mixtures of SF₆ and other inert gases (*e.g.*, nitrogen or helium) in lower-voltage applications, most studies have concluded, "that there is no replacement gas immediately available to use as an SF₆ substitute"¹⁰⁹ for high-voltage applications. The Air District therefore eliminated this alternative as technically infeasible.

¹⁰⁵ Although the Air District's assessment is that oil and air-blast breakers are not feasible for this project, the District also conducted a BACT comparison between oil/air-blast breakers and SF₆ breakers in Step 4 discussed below. The Air District has concluded that oil/air-blast breakers would be eliminated from the BACT analysis for two separate and independent reasons, because they are technically infeasible under Step 2 and because their ancillary impacts outweigh their net emission benefits under Step 4.

¹⁰⁶ 2002 Energy Commission Decision, *supra* note 17, at p. 17.

¹⁰⁷ SF₆ Emission Reduction Partnership for Electric Power Systems 2007 Annual Report, December 2008, at p. 1 (available at www.epa.gov/electricpower-sf6).

¹⁰⁸ *See, e.g.*, NIST Technical Note 1425, *supra* note 104; *see also* U.S. Climate Change Technology Program, Technology Options for the Near and Long Term, November 2003, § 4.3.5, "Electric Power System and Magnesium: Substitutes for SF₆", at 185; available at: www.climatechange.gov/library/2003/tech-options/tech-options-4-3-5.pdf

¹⁰⁹ Siemens TechTopics No. 53, *Use of SF₆ Gas in Medium Voltage Switchgear*, Siemens Power Transmission & Distribution, Inc. (June 3, 2005), (available at www.energy.siemens.com/cms/us/US_Products/Customersupport/TechTopicsApplicationNotes/Documents/TechTopics53_Rev0.pdf), at p. 3.

STEP 3: Rank Control Technologies

The Air District then ranked the feasible control technologies. The most effective (and only) control technology that the Air District found to be technically feasible is to use state-of-the-art enclosed-pressure SF₆ circuit breakers. According to information from circuit breaker manufacturers, this equipment can be guaranteed to achieve a leak rate of 0.5% or less.¹¹⁰ This leak rate meets the current maximum leak rate standard established by the International Electrotechnical Commission (“IEC”).¹¹¹ This leak rate performance will be further enhanced by an alarm system to alert operators to potential leak problems as soon as they emerge.

Although the District found that oil/air-blast breakers would not be feasible for this particular project, the District nevertheless undertook a comparison between this alternative and the enclosed-pressure SF₆ alternative, which is outlined below. Oil/air-blast breakers would be the top-ranked alternative (with essentially no greenhouse gas emissions) if they had not been eliminated as infeasible. The District has undertaken this additional analysis to compare these two technologies, even though oil/air-blast breakers have already been eliminated, to see whether this alternative would be more attractive if it were feasible here.

STEP 4: Evaluate Most Effective Controls and Economic Impacts and Document Results

Step 4 of the top-down analysis involves consideration of the ancillary energy, environmental and economic impacts associated with using the top-ranked control technologies. Although the Air District eliminated oil/air-blast circuit breakers as not technically feasible at Stage 2 of the Top-Down analysis, the Air District has nevertheless compared that technology to SF₆ breakers to see how it would compare if it were feasible. This comparison shows that the use of the larger oil/air-blast breakers would have significant ancillary environmental impacts that would offset its greenhouse gas benefits, even if it were feasible. Oil/air-blast breakers would require additional land to be devoted to the project, would generate additional noise, and would increase the risks of accidental releases of dielectric fluid and/or associated fires. By contrast, according to the National Institute for Standards and Technology, SF₆ “offers significant savings in land use, is aesthetically acceptable, has relatively low radio and audible noise emissions, and enables substations to be installed in populated areas close to the loads.”¹¹² Accordingly, even if oil/air-blast breakers were not eliminated at Step 2 of the top-down analysis, they would not surpass the choice of SF₆ breakers in Step 4 because of their ancillary environmental impacts.

STEP 5: Select BACT

Based on this top-down analysis, Air District has concluded that using state-of-the-art enclosed-pressure SF₆ circuit breakers with leak detection would be the BACT control technology option. Breakers using oil or compressed air as a dielectric material are not technically feasible here because of their greatly increased size, and even if they were feasible the offsetting ancillary impacts would not preclude the choice of SF₆.

¹¹⁰ Email message from Tony Conte, Sr. Account Manager, ABB, 4/28/09; email message from Jason Cunningham, Regional Sales Manager, HVB AE Power Systems, Inc., 4/27/09.

¹¹¹ IEC Standard 62271-1, 2004.

¹¹² *NIST Technical Note 1425*, *supra* note 104, at p. 3.

Select Appropriate BACT Emissions Limit

State-of-the-art enclosed-pressure SF₆ circuit breakers with leak detection should be able to maintain fugitive SF₆ emissions below 0.5% (by weight).¹¹³ The Russell City Energy Center will require 5 breakers using 145 lbs of SF₆ each, for a total inventory of 725 lbs SF₆. At a leak rate of 0.5%, annual SF₆ emissions would be a maximum of 3.6 lbs/year, which would equal approximately 39.3 metric tons CO₂E per year. The Air District is therefore incorporating an annual emissions limit of 39.3 metric tons CO₂E per year into the final permit.

Fugitive emissions are, by their nature, very difficult to monitor directly as they are not emitted from a discrete emissions point. Fugitive SF₆ emissions can be estimated very accurately, however, by measuring “top-ups”, *i.e.*, the replacement of lost SF₆ with new product.¹¹⁴ One can conservatively (and very accurately) assume that the amount of SF₆ that has leaked and entered the atmosphere is the amount that has to be topped up to maintain a full SF₆ level. The Air District is therefore not requiring monitoring of SF₆ fugitive emissions directly, but is instead requiring surrogate monitoring through measuring the amount of SF₆ lost and using a conversion factor to assess annual SF₆ fugitive emissions in terms of CO₂E. The facility will be required to calculate annual fugitive emissions in this manner to ensure compliance with the 39.3 metric ton CO₂E limit. These monitoring and recordkeeping requirements are consistent with the requirements in other regulatory approaches to the SF₆ fugitive emissions issue.¹¹⁵

In addition, as mentioned above, the Air District is requiring the use of an alarm system to alert controllers when a circuit breaker loses 10% of its SF₆. This alarm will function as an early leak detector that will bring potential fugitive SF₆ emissions problems to light before a substantial portion of the SF₆ escapes. The facility will also be required to investigate any alarms and take any necessary corrective action to address any problems.

E. Other Greenhouse Gas Issues

Comment III.E.1. – Greenhouse Gas Emissions During Turbine Startup and Shutdown:

The Air District also received comments claiming that it should analyze greenhouse gas emissions from startups and shutdowns. These comments cited an EPA paper stating that

¹¹³ IEC Standard 62271-1, 2004; email message from Tony Conte, Sr. Account Manager, ABB, 4/28/09; email message from Jason Cunningham, Regional Sales Manager, HVB AE Power Systems, Inc., 4/27/09.

¹¹⁴ *SF₆ Leak Rates from High Voltage Circuit Breakers – U.S. EPA Investigates Potential Greenhouse Gas Emissions Source*, *supra* note 101, at p. 1.

¹¹⁵ *See generally* California Air Resources Board’s Regulation for the Mandatory Reporting of Greenhouse Gas emissions, 17 Cal. Code Regs. §§ 95100 *et seq.* (hereinafter, “Mandatory Reporting Rule”) (available at: www.arb.ca.gov/regact/2007/ghg2007/frofinoal.pdf). (Note that the Mandatory Reporting Rule contains a *de minimis* exemption that is not being included in the Federal PSD Permit reporting requirements.) The Mandatory Reporting Rule adopts the reporting protocol developed by EPA’s SF₆ Partnership methodology, which requires tracking of the change in inventory, purchases/acquisitions and sales/disbursements of SF₆, and the change in total nameplate capacity. It also adopts the EPA SF₆ Partnership’s reporting protocol form, which appears at Appendix A-21.

methane emissions are highest during startup and shutdown, and methane is 21 times more reactive than CO₂.

Response: The Air District agrees that if BACT is to be applied for greenhouse gas emissions, appropriate consideration should be given to startup and shutdown emissions. The same control technology analysis applies to startup and shutdown emissions as applies to steady-state emissions, however: use the most efficient power generation technology that is technologically feasible. (*See generally* BACT analysis discussion for combustion turbine greenhouse gas emissions in the Statement of Basis, in the Additional Statement of Basis, and in these Responses to Comments.) The Air District is unaware of any more efficient generating equipment that would reduce greenhouse gas emissions during startups, and the commenter has not pointed to any. The Air District therefore does not find any reason to alter its greenhouse gas BACT analysis based on startup and shutdown emissions. Moreover, the Air District notes that startup and shutdown emissions will be included in the BACT emission limits. These limits therefore satisfy the BACT requirement for greenhouse gas emissions during these periods to the extent BACT is applicable.

Comment III.E.2. – BACT for Other Species of Greenhouse Gases:

The Air District also received comments stating that it should undertake a BACT analysis for other greenhouse gases besides CO₂, including methane, N₂O and SF₆.

Response: The Air District agrees that if the Applicant wants voluntarily to agree to be subject to BACT limits for greenhouse gases for this project, it should be subject for all of the greenhouse gases that would be emitted from combusting natural gas to generate electrical power, which include CO₂, methane and N₂O as the comments noted. The Air District has therefore included all three of these greenhouse gases in its BACT analysis. These pollutants are emitted essentially in fixed proportions from burning natural gas, and the amounts in which they are emitted are essentially a function of the amount of gas burned. The appropriate BACT technology analysis for all of these pollutants is therefore the turbine efficiency analysis described in the Statement of Basis and Additional Statement of Basis, as elaborated on in these Responses to Comments. The most efficient combined-cycle natural-gas combustion turbine technology for this type of application – *i.e.*, the one that generates the needed power using the least amount of natural gas – is the appropriate BACT technology. Moreover, the numerical BACT limits established in the permit ensure that this level of efficiency will be maintained (with an appropriate margin of compliance); and also provide specific numerical limits for each of these three greenhouse gases (as well as CO₂e, which is a weighted average of the three). With regard to SF₆, the Air District again agrees that if the Applicant wants voluntarily to agree to be subject to BACT limits for greenhouse gases, it must subject any SF₆ emissions to a BACT analysis. The Air District therefore undertook a BACT analysis and established BACT emissions limits for the facility's circuit breakers, which are a potential source of SF₆ emissions.

Comment III.E.3. – Air District Greenhouse Gas Emissions Fees:

The Air District received comments claiming that the permit should acknowledge the greenhouse gas fees that the facility will be required to submit to the Air District under District Regulation 3-334. Some comments questioned whether the facility would be required to pay the same amount of fees if it were to emit fewer emissions.

Response: These comments are correct that greenhouse gas emissions sources such as the proposed Russell City Energy Center will be subject to a permit fee that the Air District charges under its state-law authority to help defray the costs of its climate protection work. This fee is not connected to the Federal PSD Permit, it is imposed in connection with the District's state-law permit. The fee schedule is progressive and linked to the amount of greenhouse gases the facility emits, so that larger projects with more emissions must submit greater fees than smaller projects with fewer emissions. These fees are charged in connection with permit issuance, and are not established as permit conditions. There is no benefit from putting the fee requirement in the permit conditions, as the fees are enforceable and recoverable at the time of permit issuance. Moreover, these fees are not part of the federal PSD permit program, and so they would not belong in a Federal PSD permit in any event.

Comment III.E.4. – Basing Greenhouse Gas Emissions on Natural Gas Consumption:

The Air District received comments stating that greenhouse gas emissions should be evaluated based on natural gas consumption and with ammonia slip included.

Response: The Air District agrees that greenhouse gas emissions should be evaluated (at least in part) based on natural gas consumption, as greenhouse gas emissions are directly related to the amount of natural gas burned. The greenhouse gas mass emissions limits the District is imposing are based on heat input, which is a measure of natural gas consumption. The Air District disagrees, however, that ammonia slip should be considered as having greenhouse gas implications. The Air District is not aware of any evidence that ammonia slip has any significant impact on global climate change, and the commenters have not pointed to any. The Air District published this position in the Additional Statement of Basis (*see* p. 41) and invited any members of the public to comment if they had any information on which to conclude that ammonia should be included as a greenhouse gas in these analyses. The Air District received no further comment on this point, and therefore concludes that ammonia need not be considered in the greenhouse gas analysis.

IV. NO₂ ISSUES

The District also received several comments on its BACT analysis for NO₂. These comments are addressed in this section.

A. Evaluation of “EMx” As An Alternative Control Technology

The Air District received several comments regarding its evaluation of alternative control technologies for reducing NO₂ emissions. The comments the District’s analysis of the potential ancillary impacts of selecting Selective Catalytic Reduction (“SCR”) as the BACT control technology over EMx technology.¹¹⁶ With respect to ancillary environmental impacts in particular, the Air District received comments focusing on two areas involving ammonia: (i) the potential for impacts from accidental ammonia releases in connection with the transportation, handling, and storage of the aqueous ammonia that will be used to supply ammonia for injection into the SCR system; and (ii) the potential for impacts from emissions of un-reacted ammonia from the SCR system exhaust (“ammonia slip”). These issues are implicated in the BACT analysis comparison between EMx and SCR because the Air District found in the Statement of Basis (*see* pp. 26-27) that EMx does not use ammonia injection as part of the control system, whereas with SCR the use of ammonia is required as a reagent to reduce the NO₂ to elemental nitrogen and water. As explained below, the Air District disagrees that there are any significant ancillary environmental impacts associated with ammonia injection that would rule out the choice of SCR as the BACT control technology.

Comment IV.A.1. – Currentness of Information Used In Comparing Energy and Economic Impacts of SCR vs. EMx Control Technologies:

The Air District received several comments expressing a concern that the some of the sources of information it used to compare the energy and economic impacts of SCR and EMx control technologies are now several years old. For example, comments questioned whether there may be some better method of estimating the costs of using an SCR control system than using the ONSITE SYCOM Energy Corp. cost analysis adjusted for inflation using the consumer price index. Some comments also questioned whether it was appropriate for the District to rely on a study from 2000 in comparing the energy impacts of SCR and EMx control options.¹¹⁷

¹¹⁶ The Air District identified both combustion control technologies and post-combustion control technologies as available and appropriate for NO₂ emissions control, and required both types of technologies as BACT. (*See* Statement of Basis at 22-29.) The Air District did not receive any comments objecting its choice of combustion controls, and so it is addressing only the post-combustion control elements of the analysis in these responses.

¹¹⁷ Some comments also expressed a concern about the portions of these documents that were attached as Appendix F in the June 2007 Final Determination of Compliance (“FDOC”), stating that they were excerpts from the full documents, that they were provided without adequate explanation, and that some of the text was not clearly legible. The Air District disagrees that it was inappropriate to append only excerpts of the documents with the FDOC. The Air District appended the relevant portions to assist members of the public in understanding the District’s analysis, and appending the full document would simply have added many additional irrelevant pages to the FDOC without any additional benefit. The Air District also disagrees that the

Response: The Air District disagrees that the energy and cost information it used to compare SCR and EMx as control technologies for NO₂ emissions is unreliable as a result of its age. With respect to the relative costs of the two technologies, some of the underlying information the Air District used in its analysis was several years old (although other sources were current), but the Air District adjusted those costs for inflation over that time period to obtain cost estimate information in current dollars. (See Statement of Basis at pp. 25-26 and fn. 19.) Adjusting costs for inflation in this way is a well-accepted method of estimating current costs, and the commenters have not suggested that doing so is unreliable in any way, have not suggested that the Air District's estimates are inaccurate, and have not provided any other cost estimate that they contend should be used instead. For all of these reasons, the Air District does not find any reason to question the validity of the cost comparison set forth in the Statement of Basis.

With respect to the analysis of ancillary energy impacts, these technology alternatives have not changed in any significant way since the various sources of information cited in the Statement of Basis were published, and so there is no reason to doubt the current validity of the information for purposes of the BACT comparison. Moreover, none of the comments cited any way in which these relative impacts have changed. The Air District therefore does not find any reason to question the continued validity of the information it used in its energy impact comparison.

Finally, the Air District notes that although the comments questioned the vintage of some of the sources of information that the Air District used in comparing these two technologies, no comment has pointed to any more recent information that could suggest that the Air District's ultimate conclusion – that neither of the two alternative technologies has any ancillary impacts significant enough to warrant elimination from consideration as a BACT technology – was incorrect (with the exception of ammonia-related concerns, which are addressed separately below). Moreover, no commenter has questioned the Air District's ultimate choice of SCR as the appropriate BACT technology. The Air District therefore finds nothing in these comments to

documents were not adequately explained, as the data was referenced – and its relevance to the BACT analysis explained – in the discussion of the NO_x BACT analysis in Section IV.A.1. of the FDOC (p. 108 under the numbering in the version attached with the December 2008 Statement of Basis). The Air District also disagrees that the documentation it appended was not legible. The Air District has reviewed the record copy of the appended information and found it to be legible. The Air District also reviewed the electronic copy it made available on its website, and the appended documents appear legible. (See www.baaqmd.gov/~media/Files/Engineering/Public%20Notices/2009/15487/B3161_nsr_15487_sb-corrected_121208.ashx.) For all of these reasons, the Air District disagrees that there was anything inappropriate about the data supporting its BACT analysis that it appended to the FDOC. Moreover, the comments did not suggest that there was any additional information that was not included or not clear in what the District appended that would alter the BACT analysis in any way, and the comments have not suggested that the District should have reached a different conclusion or imposed different permit conditions based on the documentation at issue here. The Air District therefore finds nothing in these comments to suggest that it should not issue the permit, or that it should issue the permit with any different conditions.

suggest that it should change its BACT technology analysis for NO₂ controls based on relative economic and energy impacts.¹¹⁸

The Air District published this further justification for the basis of its NO₂ BACT alternatives analysis as outlined above in the Additional Statement of Basis in response to these comments, and invited any members of the public who still questioned the accuracy of the information or the outcome of the BACT analysis to comment on how the Air District's information may be inaccurate and what the Air District could do to improve its accuracy. The Air District received no further comment on these issues during the second comment period, and no comment suggesting that the District's NO₂ BACT analysis should have reached a different outcome or that the proposed NO₂ permit limits should be changed (with the exception of ammonia-related issues, which are addressed below). The Air District therefore concludes that the information about the various NO₂ control technologies evaluated is sufficiently accurate and reliable to support the BACT analysis. There is nothing in these comments that would provide any reason why the District's NO₂ BACT analysis or limits are improper or need to be revised based on these issues.

Comment IV.A.2. – Potential For Accidental Ammonia Spills/Releases:

The Air District received several comments expressing a concern about the potential ancillary environmental impacts associated with the risk of an accident or spill that could cause an ammonia release. The Air District addressed this potential impact in the Statement of Basis, and found that it would not be a significant risk for a number of reasons, including the myriad safeguards and regulatory requirements that will be implemented to mitigate the risk of accidental ammonia releases, as well as the fact that the Energy Commission evaluated the risk as part of its CEQA-equivalent environmental review and found that the risk would be less than significant. (*See* Statement of Basis at p. 26.) The Air District therefore concluded that the risks from ammonia use are not significant enough to rule out SCR as a BACT control technology in favor of EMx. Several of the comments criticized the Air District's analysis in this regard. Some comments criticized the Air District's references to the CEC's analysis on ammonia risks. These comments claimed that the CEC found that there will be a significant risk of health impacts from an accidental ammonia spill, contrary to the Air District's assertion in the Statement of Basis. Other comments questioned whether the applicant has completed the risk-

¹¹⁸ The Air District also received a comment questioning why, according to the Statement of Basis, it is "not known" whether Kawasaki Heavy Industries plans to make XONON technology available for other manufacturers' turbines, and whether the District should research this information further. The Air District has not researched whether XONON-brand catalytic combustors will be made available for other manufacturers' turbines because this type of combustion technology is available only for small turbine applications, and is not available for large-scale combustors used in large facilities such as this one. (*See* Statement of Basis at p. 24.) The Air District therefore concluded that this technology is not available as a BACT technology choice, making the issue of what manufacturers can provide the technology moot. The Air District published this response in the Additional Statement of Basis and invited members of the public contended that this is an issue that is relevant to the PSD Permit analysis to explain how and why. The Air District did not receive any comments suggesting that this is a relevant issue, and so it continues to believe that the issue is moot.

reduction requirements that the CEC established in Condition HAZ-2 of its license (regarding preparation of a Risk Management Plan and Hazardous Materials Business Plan); and further questioned whether the District should review those plans in assessing the significance of the risks of a potential accidental ammonia releases. Another set of comments focused specifically on the potential hazards to aircraft in the case of an accidental ammonia release. These comments stated that in the event of a release ammonia vapors could act as irritants to pilots and air passengers flying over the area, and in particular could affect pilots' ability to operate their planes safely.

Response: The Air District has reconsidered its analysis of potential hazards associated with ammonia transportation, storage, and use. Based on this review, the Air District has found no reason to alter its conclusion that with the appropriate risk reduction and mitigation measures in place, the ancillary environmental impacts associated with the risk of ammonia releases will not be significant and do not provide a reason to reject SCR as the BACT technology. The Air District is fully aware that ammonia is a hazardous substance and that a catastrophic release of ammonia in sufficient quantities could have significant impacts, including health hazards to workers at the site, to nearby residents and others in the vicinity of the facility, and to crews and passengers of aircraft that could be exposed to released ammonia at harmful levels, among others. But with the appropriate safeguards in place, such as the Federal Clean Air Act's Section 112(r) Risk Management Plan requirements, the requirements of the California Accidental Release Prevention Program, the Safety Management Plan requirements, and the fact that aqueous ammonia will be used and not the more dangerous anhydrous ammonia, among other safety measures, the *risk* of such an occurrence will be minimal. As a result, the *risk* associated with ammonia transportation, storage and use will not be significant. The Air District clearly explained this analysis in the Statement of Basis and further in the Additional Statement of Basis in order to support the District's conclusion that the risks associated with ammonia use are not significant and do not provide a reason to reject SCR as a control technology.¹¹⁹ The Air District did not receive any comments to the contrary, during either of the comment periods. The only comments the Air District received on these issues addressed the significance of the impact in the unlikely event of a catastrophic ammonia release – not the significance of the *risk* of such a release resulting from the use of ammonia in the SCR system. There Air District therefore finds nothing in any of the comments it has received on this issue to suggest that the risks from ammonia use are sufficiently high to reject SCR as a control technology.¹²⁰

¹¹⁹ See Statement of Basis at p. 26 & fn. 20, Additional Statement of Basis at 43-44; see also CEC Decisions & Staff Assessments cited therein (discussing safety requirements and mitigation measures and reasons why risk less than significant).

¹²⁰ Some comments also questioned whether an air quality model that the CEC referenced in its analysis of potential off-site impacts from an accidental ammonia spill – EPA's SCREEN3 model – is appropriate for such an analysis. These comments also questioned whether it was appropriate for the District to rely on the CEC's report, as opposed to validating the modeling results itself. The Air District notes at the outset that it is not aware of any reason why the CEC's analysis, or its conclusion that off-site impacts could be significant if there was an accidental ammonia spill, could be flawed; and the comments have not provided any reason beyond merely questioning the methodology. But in any event, these issues are not relevant to the District's analysis, because the District conservatively assumes that accidental ammonia

Moreover, with respect to the comments regarding the Energy Commission's findings on this issue, the Air District reexamined the Commission's decision and found it entirely consistent with the District's analysis. The Energy Commission expressly found that "[t]he Hazardous Materials Management aspects of the project do not create significant direct or cumulative environmental effects."¹²¹ This finding was based (at least in part) on the conclusions of the CEC staff's Final Staff Assessment, which found that with the appropriate mitigation measures and safeguards against accidental releases, "impacts from the use and storage of hazardous materials [will be] less than significant."¹²² Of course, if a major ammonia release was to occur, that situation would entail significant impacts, as the Commission recognized. But like the Air District, the Energy Commission found that the safeguards in place to prevent and/or mitigate any accidental ammonia releases would adequately address this risk, and therefore that the overall impact from the use of ammonia at the facility would not be significant. This finding is consistent with the Air District's assessment in the Statement of Basis – that the potential for harm from accidental ammonia releases is not significant enough to rule out an SCR system using ammonia as a BACT technology. The commenters may have misunderstood the Air District's analysis on this point based on a sentence in the Statement of Basis that could be read to mean that the Air District believes that if an ammonia release occurred it would not have significant impacts. The Air District did not intend to imply such a conclusion, and agrees with the CEC and the commenters that an accidental ammonia release could potentially cause very significant impacts, and that this point is clear and indisputable regardless of any modeling that might be done. The Air District's conclusion in the Statement of Basis was that with the appropriate risk management requirements in place, the risk from the use of ammonia would not be significant enough to rule out SCR with ammonia use as a BACT alternative.

Regarding the comments asking about the Risk Management Plan and Hazardous Materials Business Plan that the facility will be required to prepare in accordance with CEC Condition HAZ-2, those plans are not normally prepared until shortly before construction, and in this case are not required under HAZ-2 until 60 days before construction. The Air District does not have information as to whether the applicant has completed these plans yet, but even if it has not the matter would be irrelevant here as they are not even required yet. What matters is that, under the CEC's conditions of certification and the independent legal requirements that require them even for non-CEC projects, the plans will have to be prepared. Furthermore, the detailed requirements for Risk Management Plans, Hazardous Materials Business Plans, and the other related hazardous materials safeguards are set forth in the appropriate statutes and regulations that govern those plans. The plans are reviewed by the appropriate review bodies (*e.g.*, the hazardous

releases could well involve significant off-site impacts. There does not appear to be any dispute among the commenters, the CEC, and the Air District on this point. As noted above, the Air District's analysis is based on the conclusion that, with the appropriate safeguards and mitigation measures in place to reduce the likelihood and severity of potential spills, the *risks* associated with potential releases is less than significant.

¹²¹ 2007 Energy Commission Decision, *supra* note 16, p. 115, Finding 3.

¹²² California Energy Commission, *Russell City Energy Center, Staff Assessment – Part 1 and Part 2 Combined, Amendment No. 1 (01-AFC-7C)* (June 2007), CEC 700-2007-005-FSA, at pp. 4.4-5.

materials division of the local fire department) before the facility begins operation. Those review bodies are the appropriate expert agencies to ensure that all of the applicable safeguards and precautions are in place. The Air District has no reason to believe that it should (or even could) conduct its own review to ensure that these safety requirements are being met, and the commenters have not cited any reason either. The Air District published this further information in the Additional Statement of Basis, and invited any members of the public who may still contend that final completion of condition HAZ-2 and District review of the Risk Management Plan and Hazardous Materials Business Plan should be a prerequisite to Federal PSD Permit issuance to explain why that should be the case. The Air District did not receive any further comment or information on this point.¹²³

Finally, with respect to the comments about the potential hazards to aviation that could be caused if ammonia is released in large amounts and aircrews and passengers are exposed to dangerous levels of ammonia, the Air District agrees that in the event that a catastrophic ammonia release caused such an exposure, that would be a significant impact, as would such exposures to workers, residents, or anyone else who was exposed to high levels of ammonia. But as explained above, the Air District has concluded that with the appropriate safeguards and mitigation measures in place, the risks of such accidental releases will not be significant. The Air District's analysis on this issue with respect to air traffic specifically is the same as described above with respect to the risks potential for harmful ammonia exposures to the general population in connection with the transportation, storage and use of aqueous ammonia.

Comment IV.A.3. – Potential Ancillary Impacts From “Ammonia Slip” Emissions:

The Air District also received a number of comments on the potential for ancillary environmental impacts due to emissions of unreacted ammonia from the Selective Catalytic Reduction (“SCR”) System. The SCR system uses ammonia as a reagent in the NO_x reduction process, but some ammonia may not be fully used up in the reaction and may be emitted in the SCR exhaust. These ammonia emissions are often referred to as “ammonia slip”.

One group of comments claimed that using SCR will have a significant ancillary environmental impact resulting from ammonia slip through the potential for ammonia emissions to contribute to the formation of secondary particulate matter. The Air District evaluated the potential for such an impact in its Statement of Basis documents and found that secondary PM impacts would not be significant – and would not constitute a reason to reject SCR as a control technology – because the Bay Area is nitric-acid limited and additional ammonia emissions will not have sufficient nitric acid to react with to form significant amounts of particulate matter. (*See* Statement of Basis at pp. 26-27 and Additional Statement of Basis at pp. 45, 55-57 (citing a 1997 District memorandum entitled “A first look at NO_x/Ammonium nitrate tradeoffs”).) The comments the Air District received after publishing these documents criticized the Air District's analysis on this issue. Among other concerns, the comments claimed that the memorandum the District cited in support of its conclusion that the Bay Area is nitric-acid limited was specific only to the San Jose and Livermore areas and cannot be used to support a determination for the

¹²³ In response to comments about hazardous materials generally, the Air District notes that these hazardous materials measures address the risk from any hazardous materials that might be used or stored at the facility, not just ammonia.

Hayward area. The comments stated that the District should conduct a site-specific study to evaluate the use of SCR in the context of the top-down analysis. The comments also claimed that Air District staff are currently reevaluating the District's earlier conclusion expressed in the cited memorandum that the region is nitric acid limited. Some comments also questioned the District's statement in the support document for the initial permit that the potential impacts of ammonia slip emissions on the formation of secondary particulate matter within the boundaries of the San Joaquin Valley Air Pollution Control District is not known. Other comments also questioned the District's conclusion that secondary particulate impacts are not significant enough to justify elimination of SCR as a control technology for NO₂, and specifically asked what threshold the District would use for considering a secondary particulate impact significant. In general, this first group of comments suggested that the actual secondary PM_{2.5} impacts from the facility may be much larger than anticipated because of the ammonia slip emissions.¹²⁴

Second, the Air District a group of comments noting that ammonia is a hazardous air pollutant in its own right (apart from its potential to act as a precursor in forming PM), and that it could cause health impacts when emitted in the SCR exhaust. Some comments noted in particular that aircraft and air crews and passengers may fly through or near the SCR exhaust plume and in doing so could be exposed to ammonia slip. These comments implied that these potential ancillary impacts has a hazardous air pollutant counsel against selecting SCR as the appropriate BACT control technology for NO₂.

Finally, the Air District also received a third set of comments on this issue from a manufacturer of NO_x control technologies that conflicted with the comments in the first two areas. These comments stated that although EMx technology does not use ammonia, it generates ammonia and will therefore cause ammonia slip in a manner similar to SCR technology. The commenter additionally claimed that EMx technology also generates additional greenhouse gases from catalyst regeneration. The commenter cited an emissions ratio of eight pounds of CO₂ emitted through regeneration for every pound of NO_x reduced. The commenter stated that the regeneration process also creates ammonia.

Response: The Air District has further considered the potential for ancillary environmental impacts associated with ammonia slip emissions from SCR vs. EMx technology in light of these comments. At the outset, the Air District acknowledges the comments stating that EMx technology will also emit ammonia slip in a manner similar to SCR technology. The Air District is not aware of any independent information that EMx will cause ammonia slip emissions (and the comments did not cite any), although to the extent that this assertion is true it would render this issue moot in the comparison of SCR vs. EMx, as the ammonia slip impacts would be equal. The Air District concludes that it does not have to make a definitive determination of whether EMx technology will or will not cause ammonia emissions, however. Even assuming that SCR

¹²⁴ Comments also stated that reducing ammonia slip would reduce the amount of ammonia that the facility would need to transport, store, and use. But to the extent that there would be any incremental benefit from such reductions (which is nothing more than speculative), it would not be significant given that the risks from ammonia transport, storage and use as currently planned are already be less than significant.

involves ammonia slip and EMx does not, the ammonia slip resulting from SCR would not cause significant ancillary environmental impacts sufficient to require SCR to be rejected, as the District explained in the Statement of Basis and Additional Statement of Basis.

In response to comments that ammonia slip could cause secondary particulate matter formation, the Air District reevaluated its initial determination that ammonia slip emissions will not cause any significant secondary PM_{2.5} impacts. This further analysis is explained in full in the discussion of particulate matter issues below, as well as in the section on the PSD source impact analysis for PM_{2.5}. (See Response to Comment No. VI.2 and Response to Comment No. XIII.B.3., which Responses are incorporated by reference herein.) As explained there, the Air District found that its conclusion that ammonia slip emissions will not be a significant contributor to secondary particulate matter formation is still justified. Based on this detailed analysis and careful consideration of all of these comments, the Air District concludes that its initial assessment in the Statement of Basis is correct. The Air District therefore concludes that ammonia slip emissions would not have a significant collateral environmental impact regarding secondary particulate matter formation that would rule out SCR as a control technology for NO₂ compared with EMx technology.

The Air District has also considered the potential for ancillary environmental impacts from ammonia slip as a hazardous air pollutant in its own right, apart from the potential for contribution to secondary particulate matter. The Air District included ammonia slip emissions in its Health Risk Analysis for the facility, and found that emissions of all hazardous air pollutants, including ammonia and all other such pollutants, would not cause any significant health impacts. Issues concerning this Health Risk Analysis are discussed in more detail in the Statement of Basis at pp. 14-16 and 65-66, the Additional Statement of Basis at pp. 93-95, and in this Response to Comments document below in Section XIV (and with respect to ammonia impacts specifically in Response to Comment XIV.4). In particular, with regard to the comments about the potential for ammonia slip emissions to impact aircrews and passengers in aircraft flying near the project site, the Air District points to the additional health risk analysis it performed for airborne receptors as described in the Additional Statement of Basis at pp. 94-95 and in Response to Comment XIV.7. below.¹²⁵ As with the general Health Risk Assessment, this further analysis shows that there will not be any significant ancillary environmental impacts with respect to ammonia or other toxics exposures to aircrews or passengers that would rule out the selection of SCR as the BACT control technology. Based on all of this analysis, the Air District concludes that there will not be any significant ancillary environmental impacts regarding health risks from ammonia slip emissions that would rule out selection of SCR as the BACT control technology.

Finally, the Air District also notes that it examines potential collateral environmental impacts such as these on a case-by-case basis and does not have a bright-line rule for when a potential collateral impact would be considered “significant” or not. But certainly, in a case such as this one where the available evidence suggests that ammonia slip will cause only minimal secondary

¹²⁵ Additionally, with respect to aviation safety risks generally, see Response to Comment XIX.9. below.

particulate matter formation – if any at all – the potential for such impacts would not be significant enough to eliminate a particular control technology in the BACT analysis.

B. Consideration of Substituting Urea Instead of Aqueous Ammonia As Source of Injected Ammonia For SCR System

Comment IV.B.1. – Use of Urea Instead of Ammonia in SCR System:

The Air District also receive comments stating that, if the Air District does decide to select SCR as the BACT control technology, it should require the facility to use urea instead of ammonia in the SCR system in order to reduce the potential for impacts from accidental ammonia releases. These commenters cited a technology called NOxOUT ULTRA that they claimed was feasible to allow the substitution of urea for ammonia.

Response: The Air District considered the use of urea instead of ammonia in the SCR system in response to these comments. This is a common technology for controlling NOx from reciprocating internal combustion engines, but it is not normally used in combined-cycle power plants. The Air District considered the NOxOUT ULTRA technology cited in the comments, which generates ammonia from urea just before it is injected into the SCR system, thus eliminating the need to store aqueous ammonia at the site.¹²⁶ The elimination of ammonia storage would alleviate the risk of any significant amount of stored ammonia being released accidentally, and so the Air District evaluated it as an alternative technology under Step 4 of the Top-Down BACT analysis, in which ancillary environmental impacts are considered to determine whether an alternative technology should be chosen. SCR technology would be equally effective at reducing NO₂ emissions using either ammonia or urea, and so both options would be ranked No. 1 at Step 3 of the BACT analysis. The question at Step 4 is whether one of the alternatives is preferable to the other as a means of achieving the BACT emissions limit, given the potential for any ancillary environmental effects.

The Air District has concluded that because the risks of using SCR with ammonia are so small and will be adequately addressed by the safeguards that the facility will be required to put in place, there will be no additional benefit from using urea instead of ammonia that would be significant enough to reject ammonia use in the BACT analysis and require urea instead. As the Air District discussed in detail above in Response to Comment IV.A.2., the risks of accidental releases of ammonia from the SCR system are slight and will be adequately addressed under applicable industrial safety codes and standards, as addressed by the safety requirements outlined in the Energy Commission's licensing documentation. Given the relatively low risk of accidental releases and the additional safeguards provided by these measures, the District concluded that the potential for impacts from the use of ammonia in the SCR system was not significant enough to reject SCR as a control alternative. For the same reasons, the risk is not significant enough to require the facility to avoid ammonia by using NOxOUT ULTRA instead.

¹²⁶ See Product Brochure, "NOxOUT ULTRA NOx Reduction Process", Fuel Tech, Inc., 2001 (attached with Jan. 17, 2009, comment from Doug Kirk, Regional Sales Manager, Fuel Tech, Inc.).

The risk of any significant ammonia problems is sufficiently remote that it does not provide a reason why urea must be chosen under Step 4 in the BACT analysis over ammonia.¹²⁷

Moreover, in addition to the lack of any significant benefit from using urea given the remote and well-controlled nature of the risk from using ammonia, the Air District has also evaluated information suggesting that there may be ancillary adverse environmental impacts from using urea instead of ammonia. One potential ancillary adverse impact the Air District is concerned about is through increased greenhouse gas emissions from urea injection. Studies have shown that urea injection can increase the selectivity of the SCR process in a high-NO₂ environment towards the formation of N₂O, a highly potent greenhouse gas.¹²⁸ Any substantial increase in N₂O emissions could have adverse climate change consequences that would outweigh any potential risk reduction benefits from eliminating ammonia storage. Furthermore, according to the NOxOUT-ULTRA product literature, the decomposition of the urea into ammonia for injection into the SCR system requires a burner, which would have to burn fuel and would generate additional greenhouse gases, with similar negative climate change impacts.¹²⁹ The Air District would be wary of incurring these ancillary adverse climate change impacts associated with urea use, even if hadn't concluded that the risks associated with ammonia risks are not significant.

Another potentially adverse collateral environmental impact the Air District identified in the Additional Statement of Basis would be through increased emissions of formaldehyde, a hazardous air pollutant and toxic air contaminant. As the Air District explained in the Additional Statement of Basis, data from a similar facility in Sumas, Washington, which had experimented with the use of urea for NOx control for a short period of time, showed that urea injection (as opposed to use of ammonia) resulted in a nearly five-fold increase in formaldehyde emissions.¹³⁰

¹²⁷ The Environmental Appeals Board has also remarked at the remoteness of the possibility of a catastrophic failure of an ammonia SCR system. (*See, e.g., In re Kawaihae Cogeneration Project*, 7 E.A.D. 107, 117 (EAB 1997).) The Air District is aware of one incident at a facility in Blythe, CA, in which ammonia was apparently released from a cooling system. That incident apparently involved ammonia used as a refrigerant in a cooling system, not as a reagent in an SCR system, and the amount released was not great enough to cause any injuries. While any industrial incident needs to be taken seriously, the Air District does not believe that this incident establishes that using ammonia in an SCR system poses a significant risk of catastrophic ammonia releases.

¹²⁸ *See* Low Temperature Urea Decomposition Phenomena in SCR Systems, C. Scott Sluder (Primary Contact), John M.E. Storey, Samuel A. Lewis, Linda A. Lewis, Oak Ridge National Laboratory, p. 3, available at: www.ornl.gov/~webworks/cppr/y2001/rpt/122007.pdf (“N₂O emissions were examined for both SCR catalysts. The N₂O emissions were found to be higher for both the 152-mm and 76-mm catalysts when urea was injected compared with NH₃ injection. The data show that injection of urea causes an increased selectivity of the SCR process in a high-NO₂ environment towards formation of N₂O.”).

¹²⁹ *See* Product Brochure, “NOxOUT ULTRA NOx Reduction Process”, Fuel Tech, Inc., 2001 (attached with Jan. 17, 2009, comment from Doug Kirk, Regional Sales Manager, Fuel Tech, Inc.).

¹³⁰ *See* Additional Statement of Basis at pp. 44-45; *compare* Valid Results, Inc., test report for June 13, 2002, EPA Method 316 Source Test (0.226 tpy formaldehyde emissions with urea) *with*

The Air District concluded in the Additional Statement of Basis that this potential for increased formaldehyde emissions was another reason not to require the SCR system to use urea instead of ammonia. During the second comment period, the Air District received comments from the developer of NOxOUT ULTRA criticizing this data and the Air District's use of it in its analysis. These comments claimed that the data from the Sumas facility was incomplete, unofficial, not peer-reviewed, and did not amount to a valid scientific finding. The comments also said that the Sumas, Washington unit was an early non-commercial prototype and is not representative of the commercial installations of the product installed since 2003; that the Sumas unit was not functioning correctly at the time of the testing for formaldehyde and, further, that the testing rig had not been properly optimized at that time; and that the study should have considered that the decomposition temperature for formaldehyde is 572°F, while the decomposition temperature in a commercial NOxOUT ULTRA chamber ranges from 1,200°F to 650°F. These comments stated that the NOxOUT ULTRA product is designed to decompose urea at low pressure and high temperature to avoid formation of byproducts such as formaldehyde.¹³¹

The Air District acknowledges the commenter's concerns about relying on only limited data to conclude that urea would involve increased formaldehyde emissions, and agrees that the simple source test comparison it used was not as rigorous as a formal peer-reviewed study. Nevertheless, the limited data the District examined is the only information the District has been able to discover regarding the impact of urea use on formaldehyde emissions. Notably, although the commenter criticized the Air District's reliance on the Sumas data and claimed that there is no credible evidence that urea use will increase formaldehyde emissions, the commenter did not provide any contrary data showing affirmatively that urea use will *not* increase formaldehyde emissions.¹³² Given this record, the Air District continues to have concerns about the negative formaldehyde impacts from substituting urea for ammonia in the SCR system, although it finds it

email message from Brian Fretwell to Barbara McBride, Calpine, March 4, 2009 (0.049 tpy formaldehyde emissions without urea).

¹³¹ The Air District also received a letter after the close of the second comment period stating that the formaldehyde emissions come from the coating on solid urea pellets when the urea is used in that form, and that the problem could be avoided by using liquid urea instead of pellets. This letter was not a comment submitted during the comment period, and the Air District is therefore not obligated to respond to it. Nevertheless, the Air District has reviewed the Sumas situation and has found that the tests at Sumas were conducted using liquid urea, not pellets. Moreover, the letter did not provide any documentation or evidence to support its conclusion that increased formaldehyde formation is associated only with urea in pellet form. With no evidence on the pellet issue beyond the Sumas data, which show increased formaldehyde with liquid urea, the Air District has no basis to confirm the assertion in these comments that using liquid urea would avoid the formaldehyde problems observed at Sumas. The Air District therefore disagrees with the letter's assertions that the formaldehyde problems experienced in the Sumas tests could be avoided by using liquid urea instead of pellets. (The letter also referenced cost differences in using pellet vs. liquid urea, but relative costs were not an element of the Air District's analysis on this issue.)

¹³² One particular criticism voiced by these comments concerned the conditions under which the tests were conducted. At this date it is impossible to confirm exactly what conditions the testing was performed under, but the Air District is not aware of any specific evidence showing that any of the conditions were unrepresentative or would have led to flawed results.

difficult to conclude with certainty what the potential for such negative impacts may be at this time. Ultimately, however, the issue does not need to be resolved at this time because the Air District has concluded that the risk of accidental releases from ammonia use is not significant enough to require the facility to avoid ammonia by using NOxOUT ULTRA instead of traditional ammonia injection as a BACT requirement. The Air District continues to have concerns about formaldehyde impacts, in addition to these other conclusions, but has determined that it does not need to take a definitive position on these concerns at this time given that the rest of the evidence in the record does not support requiring the use of NOxOUT ULTRA regardless. The Air District would look forward in the future to working with the vendor of this system, and any future project applicants who may wish to explore this technology, to address these issues further.

For all of these reasons, the Air District disagrees with the comments suggesting that it should require the use of urea instead of ammonia for the SCR system under its BACT analysis in order to lessen the risk of ammonia releases.¹³³ Given the minimal nature of the risk associated with ammonia use, and the potential that there may be countervailing ancillary environmental impacts associated with urea use, the Air District does not believe that using urea to generate ammonia for the SCR system is a superior technology to using aqueous ammonia.

C. NO₂ BACT Emissions Limits

Comment IV.C.1. – Hourly NO₂ Limit:

The Air District received comments stating that the RACT/BACT/LAER Clearinghouse shows one facility with a permit limit of less than 2 ppm NO_x – the IDC Bellingham facility, which the comments stated was permitted at 1.5 ppm NO_x. The comments suggested that the Air District needs to evaluate the permit for this facility to determine whether a lower limit would be appropriate here.

Response: The Air District addressed this facility in the Statement of Basis. (*See* Statement of Basis at pp. 28-29 and fn. 23.) As the Air District explained there, the IDC Bellingham permit was based on NO₂ emissions of up to 2.0 ppm as a maximum not-to-exceed limit. The permit required emissions during most operating periods to be kept below 1.5 ppm, but it was designed specifically to accommodate the fact that emissions may rise to 2.0 ppm at times. The permit therefore supports the Air District’s conclusion that the BACT limit needs to accommodate the fact that emissions can be up to 2.0 ppm. Moreover, as the Air District noted in the Statement of

¹³³ The Air District notes that the differences between NOxOUT ULTRA and traditional ammonia injection systems concern only ammonia transportation, storage and use, not ammonia slip emissions. Both traditional SCR systems and NOxOUT ULTRA use ammonia in the NO_x control reaction. The only difference with NOxOUT ULTRA is that it generates the ammonia from urea just prior to ammonia injection, so the facility does not have to store significant amounts of ammonia on-site. (*See* Product Brochure, “NOxOUT ULTRA NO_x Reduction Process”, Fuel Tech, Inc., 2001 (attached with Jan. 17, 2009, comment from Doug Kirk, Regional Sales Manager, Fuel Tech, Inc.)) Ammonia slip emissions – as opposed to ammonia storage – is not implicated in the comparison between these two technologies because both will generate ammonia slip emissions.

Basis, that facility was never built and so there are no operating data to determine whether and to what extent emissions could actually be kept below 2.0 ppm. The commenters have not provided any analysis beyond simply reciting the permit condition that the Air District already addressed, and so the District finds no reason to revise its earlier conclusions regarding the NO₂ BACT limit.

Comment IV.C.2. – Annual NO₂ Limit:

The Air District received comments noting that the hourly BACT limit for NO_x was updated in the 2007 permitting process, and was reduced from 2.5 ppm to 2.0 ppm. These commenters suggested that the annual limit needs to be adjusted accordingly.

Response: The annual limit established in the 2002 permitting process was based on average annual emissions of 2.0. The Air District concluded during that permitting process that although short-term NO_x emissions could be as much as 2.5 ppm, on average over the longer term they would be 2.0 ppm. This new lower limit represents a very stringent BACT standard, and the Air District has no evidence to suggest that the facility will be able to maintain average emissions significantly below 2.0 over the long term. The Air District therefore used 2.0 ppm as the average steady-state emissions rate when calculating the annual facility NO₂ permit limit. The Air District published this further explanation and justification for the annual NO₂ limit in the Additional Statement of Basis, and no commenters provided any further information to suggest that the proposed annual limit is inappropriate or should be changed. The Air District is therefore finalizing the annual limit as proposed.

Comment IV.C.3. – Carlsbad Energy Center NO₂ Limit:

The Air District received comments stating that the proposed Carlsbad Energy Center in Carlsbad, CA, will have lower emissions of a number of criteria air pollutants, including NO₂. The comments stated that Carlsbad will emit only 72.8 tons per year of NO_x, compared to Russell City's 127 tons.

Response: In response to these comments, the Air District reviewed the Final Determination of Compliance for the Carlsbad facility. The Final Determination of Compliance reveals that the NO₂ emissions limit is 2.0 ppm, the same as the Air District is imposing here. The reason why the Carlsbad facility's annual emissions will be lower is because the facility will be permitted for operation for only 4,100 hours per year, whereas the Russell City Energy Center will be permitted for full-time operation throughout the year.¹³⁴ The Air District therefore disagrees that the proposed Carlsbad facility provides any reason to revisit its BACT analysis here.

¹³⁴ See Final Determination of Compliance, Carlsbad Energy Center Project, San Diego Air Pollution Control District, Applications Number 985745, 985747, and 985748, August 4, 2009, p. 8 Table 1a (2 ppm NO_x limit) and p. 10 (4100 hour operation) (available at: www.energy.ca.gov/sitingcases/carlsbad/documents/others/2009-08-04_SDAPCD_FDOC.pdf) (hereinafter, "Carlsbad Energy Center FDOC").

D. NO_x as a Precursor To Secondary PM_{2.5} Formation

Issue IV.D.1. – BACT for NO_x as a Precursor to Secondary Particulate Matter Formation:

The Air District has also further reviewed the issue of whether NO_x emissions need to be subject to BACT review and permit limits as a precursor to secondary particulate matter formation. The Air District did not receive any specific comments on this issue, but it has nonetheless undertaken further consideration of this issue of its own volition. To the extent that a BACT analysis for NO_x is required because of (i) the Bay Area's designation as "attainment/unclassifiable" for the PM_{2.5} annual standard; (ii) EPA's inclusion of NO_x as presumptively a PM_{2.5} precursor within the definition of "Regulated NSR Pollutant" for purposes of PSD permitting (*see* 73 Fed. Reg. 28321, 28349 (to be codified at 40 C.F.R. § 52.21(b)(50)(i)(c))); and (iii) the facility's NO_x emissions above the PSD significance threshold of 40 tons per year (*see id.* (to be codified at 40 C.F.R. § 52.21(b)(23)(i))), the Air District has concluded that its BACT analysis and limits for NO₂ would satisfy any BACT requirements for NO_x. NO₂ and NO_x are essentially one and the same pollutant (*see* discussion in Statement of Basis at pp. 21-22), and the BACT controls and emissions limits imposed for NO₂ will be effective to impose the most stringent achievable emissions limits for NO_x as well.

V. CARBON MONOXIDE ISSUES

The Air District also received several comments on its BACT analysis for Carbon Monoxide. In response to these comments, the Air District has reconsidered its BACT determination and is lowering the BACT limit for CO from 4.0 ppm to 2.0 ppm in the final permit. The Air District's response to the comments received is set forth below.

Comment V.1. – Determination of BACT Limit for Carbon Monoxide:

A number of comments objected to the District's initial proposal to establish the BACT Carbon Monoxide limit at 4 ppm. These comments claimed that the BACT limit should be set at 2 ppm (or even lower). The comments raised a number of related points on this issue.

- *Use of Data From Metcalf Energy Center:* Several comments criticized the District's use of Carbon Monoxide emissions data from the Metcalf Energy Center as a basis for determining that the appropriate BACT limit should be 4.0 ppm. These comments criticized the District for relying on CO data from a single facility in making its BACT determination, pointing out that there are many other facilities with similar configurations that the District could look to. The comments also claimed that the Metcalf data show that after the first year of operation,¹³⁵ the facility exceeded 2 ppm on only 0.4% of the operating days, something that could be addressed through a larger oxidation catalyst.
- *BACT Determinations by Other Agencies:* Some comments also pointed out that other permitting agencies have adopted BACT limits for CO at levels below the 4.0 ppm the District proposed. Comments cited a June 18, 2001, EPA letter to the San Luis Obispo County APCD stating that BACT for CO should be 2.0 ppm (3-hour average). Comments also cited several projects permitting with a 2 ppm CO limit in conjunction with a 2 ppm NOx limit. Comments also cited several facilities identified in EPA's RACT/BACT/LAER Clearinghouse with even lower CO limits, including Kleen Energy Systems at (0.9 ppm), CVP Warren, VA (1.3 and 1.8 ppm).
- *Distinguishing Permits With Lower CO Limits But Higher NOx Limits:* Some comments also criticized the District for distinguishing facilities that are achieving lower CO limits, but have higher NOx limits, on the grounds that there is a tradeoff between reducing NOx and reducing CO. These comments claimed that prioritizing NOx and VOC reductions over CO reductions is inconsistent with BACT, stating that BACT requires that the emissions limit for each pollutant must be the lowest achievable. Comments also stated that the NOx/CO tradeoff occurs only in the combustion equipment, and that even so more efficient combustion equipment would achieve similar reductions in both pollutants. The comments also claimed that the post-construction controls reduce NOx and CO independently and bigger control equipment can reduce both pollutants simultaneously. Some comments generally acknowledged the NOx/CO tradeoff, but stated that the District did not cite any justification in the record for its assertion that a low NOx limit requires a higher CO limit. These comments stated that even if a CO limit above 2.0 ppm CO would be necessary to allow the facility to achieve a 2.0 ppm NOx

¹³⁵ These comments also stated that Metcalf was originally permitted without an oxidation catalyst, which they claimed is a further reason to ignore the first year of emissions data.

limit, the District did not provide an explanation in the record for how high above 2.0 ppm the limit would have to be, and why a limit of 4.0 ppm is justified. A number of the comments cited several other facilities that have been permitted with low NOx and low CO limits to support their claims.

- *Distinguishing Permits With Lower CO Limits But Longer Averaging Times:* Some comments also claimed that the District should not have rejected facilities with lower CO limits as comparable on the grounds that the limit included a longer averaging time. The comments questioned the District's assertion that the 3-hour averaging time used for some permit limits at 2.0 ppm makes a limit lower than 4.0 infeasible here. Some comments claimed that averaging time is irrelevant to the emissions performance of the oxidation catalyst, which they claimed can achieve the same level of control on a continuous basis. Other comments claimed that even if using a 1-hour averaging time necessitates a limit over 2.0 ppm, the District has not explained why the limit needs to rise to 4.0 ppm. Finally, comments also claimed that there are several other facilities meeting achieving low NOx and low CO emissions, even with short (1-hour) averaging periods.
- *Distinguishing Permits With Lower CO Limits From Facilities That Have Not Yet Been Built:* Some comments also claimed that the District should not distinguish facilities that have been permitted with lower CO limits but have not yet been built. The comments asserted that another agency's determination that a CO level is achievable by itself is sufficient to conclude that it is feasible, absent a clear demonstration to the contrary. The comments claimed that a number of BACT determinations by other agencies indicate that a lower limit is achievable, and that the District should address the achievability of these lower limits.
- *Accommodating Transient and Low-Load Conditions:* Comments also criticized the District for setting the BACT limit based on what is achievable during transient and low-load conditions. Comments claimed that if transient and low-load conditions require a higher permit limit, the District should impose a 2-tier limit with one limit for normal operations and a higher one for transient/low-load. The comments also questioned the need for a higher limit for transient conditions at all, citing the experience of the Carlsbad Energy Center – which they claimed is a peaker facility and therefore subject to even more transient loads – which was permitted at 2.0 NOx and 2.0 CO (1-hr average).

Response: The Air District has evaluated these comments and has reconsidered its assessment of the available data and related information on what level of CO emissions is achievable. The Air District agrees that the appropriate BACT limit should be more stringent than the 4.0 ppm that the District initially proposed. The Air District has concluded that the appropriate BACT limit should be established at 2.0 ppm instead, as discussed below, and is therefore imposing a CO limit of 2.0 ppm, averaged over 1 hour, in the final permit.

- **Observation Regarding NOx/CO Emission Reduction “Tradeoff”**

Before reaching the question of the appropriate numerical BACT limit, however, the Air District first responds to the comments regarding the tradeoffs between lowering NOx emissions and lowering CO emissions, and between lowering the numerical emissions rate and shortening the

averaging time. These tradeoffs are important considerations to take into account when adopting BACT emissions limits. For the NO_x/CO tradeoff, the technical realities of controlling these two pollutants means that lowering combustion temperatures to decrease NO_x formation necessarily means that CO emissions will be increased because lower temperatures increase incomplete combustion. (*See generally* Statement of Basis at p. 29.) This is an important consideration to take into account in the BACT analysis for Carbon Monoxide, as the analysis is required to consider ancillary environmental impacts. Increasing NO_x is an especially important ancillary environmental impact for the Bay Area because NO_x is an ozone precursor and the Bay Area is not in compliance with the federal and state Ambient Air Quality Standards for ozone. For the tradeoff between lower permit limits and longer averaging times, the longer the averaging time the more opportunity there is for short-term emissions spikes to be averaged out by lower emissions before and after the spike. With a shorter averaging period, the numerical emission rate normally has to be set higher to accommodate such short-term spikes. A longer averaging time allows the numerical emissions rate to be set lower, which can have the effect of reduced emissions over the long term. The District therefore disagrees, as a general matter, with the commenters who discounted the importance of these tradeoffs in the District's approach to air pollution control. This issue is ultimately immaterial in the question of what BACT limit to impose here, however, as these tradeoffs are not being made part of the District's BACT analysis for this permit. The Air District's CO BACT analysis is based on the lowest achievable CO emissions rate taking into account ancillary environmental, economic and energy impacts, without regard to NO_x considerations.

- **Reduction of CO Emissions Limit from 4.0 ppm in Initial Proposal to 2.0 ppm**

Turning to the question of what numerical BACT limit is appropriate for this facility, the Air District has reevaluated its assessment from the Statement of Basis that while CO emissions can be kept below 2 ppm under most conditions, under some conditions (*e.g.* transient load conditions) emissions may rise to as high as 4 ppm. (*See* Statement of Basis at p. 32.) The Air District finds it significant, as pointed out by a commenter, that the operating data from the Metcalf Energy Center, a similar operation, show that only 0.4% of the days of operation showed any exceedance of 2.0 ppm after the first year of operation. The Air District agrees that a more critical analysis of this data suggests that it is possible to design the system to ensure that Carbon Monoxide emissions are maintained below 2.0 ppm at all times.

The Air District also agrees with the commenters that the significant number of permitting agencies that have issued permits with Carbon Monoxide limits below 4.0 casts doubt on whether 4.0 is the lowest emissions performance that is achievable for this type of equipment. The Air District notes that there were a total of 8 permits identified in the Statement of Basis with Carbon Monoxide limits of 2 ppm (either with 1-hour averages or 3-hour averages), suggesting an emerging consensus that this performance level is achievable. (*See* Statement of Basis, Table 11, pp. 32-33.)¹³⁶ Based on this further assessment of the data, and on the large

¹³⁶ The Air District disagrees with the comments that the mere issuance of a permit with a particular limit establishes that limit as BACT, without some further demonstration that the limit is achievable. A permitting agency may issue permits with very stringent limits with little or no technical justification at all if the applicant does not object to it. In such a situation, where there

number of permitting agencies that have required other similar facilities to limit Carbon Monoxide emissions to 2.0 ppm averaged over 1 hour, the Air District concludes that this 2.0 ppm limit (1-hour average) should be required here as BACT. If this limit is being applied and demonstrably achieved at other facilities, that fact supports a presumption that it is an achievable limitation at this facility for purposes of BACT.

- **Consideration of CO Emissions Limit Below 2.0 ppm**

Finally, the Air District also considered the comments regarding permits that have been issued containing Carbon Monoxide limits below 2.0 ppm, for Kleen Energy Systems¹³⁷ and CPV Warren¹³⁸, and whether it might be appropriate to impose a BACT CO limit below 2.0 for this facility. The Air District notes that neither of these facilities has been built yet and so there is no operating data available on which to assess whether they will actually be able to meet these lower limits. This point, along with the fact that the consensus among other permitting agencies appears to have coalesced around 2.0 for most facilities, underscores the requirement that lower limits must be considered on a case-by-case basis. The Air District has therefore evaluated whether a CO emissions limit of less than 2.0 ppm would be achievable by this particular facility, “taking into account energy, environmental and economic impacts and other costs” as is required in establishing a BACT limit.

To undertake this analysis, the Air District evaluated information from the applicant on the costs and emissions reduction benefits of installing a larger oxidation catalyst capable of consistently maintaining emissions below 1.5 ppm.¹³⁹ Based on these analyses, the cost of achieving a 1.5 ppm permit limit would be an additional \$179,600 per year (above what it would cost to achieve a 2.0 ppm limit), and the additional reduction in CO emissions would be approximately 11 tons per year, making an incremental cost-effectiveness value of over \$16,000 per ton of additional

is no justification for the limit nor any operating data to show that the limit can be complied with, the mere existence of the permit limit would not, without more, establish that the limit is achievable as a technical matter. This point is moot for the Carbon Monoxide analysis here, however, as the Air District has specifically examined whether a limit below 2.0 ppm should be required as BACT here. Based on this case-specific analysis, the Air District has concluded that BACT would not require a lower limit for this facility. There is nothing in the permitting documents for Kleen Energy Systems, CPV Warren, or any other facility to suggest that lower limits should be required for Russell City.

¹³⁷ New Source Review Permit to Construct and Operate a Stationary Source, issued to Kleen Energy Systems, LLC, by Connecticut Department of Environmental Protection, Bureau of Air Management, February 25, 2008.

¹³⁸ Prevention of Significant Deterioration Permit, Stationary Source Permit to Construct and Operate, issued to CPV Warren LLC, by Virginia Department of Environmental Quality, State Air Pollution Control Board, July 30, 2004, as amended January 14, 2008.

¹³⁹ A potential lower limit of 1.5 ppm provides a reasonable basis for this analysis because that number is in the middle of the range of permit limits below 2.0 found in the other permits the Air District reviewed. Given that the results of the cost-effectiveness analysis for a 1.5 ppm limit are well above what has been required at other similar facilities to achieve CO reductions, the Air District has no reason to believe that any other limits below 2.0 ppm would be cost-effective for purposes of the BACT analysis, either.

CO reduction.¹⁴⁰ Moreover, the total cost of achieving a 1.5 ppm CO limit (as opposed to the incremental costs of going from 2.0 ppm to 1.5 ppm) would be over \$840,000 per year, and the total emission reductions of a 1.5 ppm limit would be 186 tons per year, resulting in a total (or “average”) cost effectiveness value of over \$4,500.¹⁴¹ Based on these high costs (on a per-ton basis) and the relatively little additional CO emissions benefit to be achieved (on a per-dollar basis), requiring a 1.5 ppm CO permit limit cannot reasonably be justified as a BACT limit. Requiring controls to meet a 1.5 ppm limit would be far more expensive, on a per-ton basis, than what other similar facilities are required to achieve. The Air District has not adopted its own cost-effectiveness guidelines for CO,¹⁴² but a review of other districts in California found none that consider additional CO controls appropriate as BACT where the total (average) cost-effectiveness will be greater than \$400 per ton, or where the incremental cost-effectiveness will be over \$1,150 per ton.¹⁴³ Moreover, a review of recent CO BACT determinations in EPA’s RACT/BACT/LAER Clearinghouse did not reveal any permits that had imposed CO controls at a cost-per-ton in the range that would be required here. The permits in the Clearinghouse going back through 2005 that included cost-effectiveness information showed a limit of 1.8 ppm being imposed based upon an average cost-effectiveness of \$1,750 per ton of CO;¹⁴⁴ a limit of 3.5 ppm based upon an average cost-effectiveness of \$2,736 per ton and an incremental cost-effectiveness of \$5,472 per ton;¹⁴⁵ and a limit of 2.0 ppm an average cost-effectiveness of \$1,161 per ton of CO.¹⁴⁶ Both the average and incremental cost-effectiveness values of imposing a 1.5 ppm limit for the Russell City facility would be substantially higher than what was required for any of these other similar facilities.

¹⁴⁰ See Spreadsheet, Incremental Cost Effectiveness Analysis for CO Control From 2 to 1.5 ppmv, prepared by Barbara McBride, Calpine Corp., reviewed by Weyman Lee, P.E., BAAQMD.

¹⁴¹ See Spreadsheet, Average/Total Cost Effectiveness Analysis for CO Control from 2 to 1.5 ppmv, prepared by Barbara McBride, Calpine Corp., reviewed by Weyman Lee, P.E., BAAQMD.

¹⁴² Bay Area Air Quality Management District Best Available Control Technology (BACT) Guideline, § 1, Policy and Implementation Procedure (available at: www.baaqmd.gov/pmt/bactworkbook/default.htm).

¹⁴³ Cf. South Coast Air Quality Management District, *Best Available Control Technology Guidelines*, August 17, 2000, revised July 14, 2006 (hereinafter, “South Coast BACT Guidelines”), at 29 (available at: www.aqmd.gov/bact/BACTGuidelines2006-7-14.pdf); Memorandum, David Warner, Director of Permit Services, to Permit Services Staff, Subject: “Revised BACT Cost Effectiveness Thresholds”, May 14, 2008 (available at: www.valleyair.org/busind/pto/bact/May%202008%20updates%20to%20BACT%20cost%20effectiveness%20thresholds.pdf.)

¹⁴⁴ U.S. EPA RACT/BACT/LAER Clearinghouse Identification No. GA-0127, for permit issued to Southern Company/Georgia Power, Plant McDonough Combined Cycle, Permit No. 4911-067-0003-V-02-2, issued January 7, 2008.

¹⁴⁵ U.S. EPA RACT/BACT/LAER Clearinghouse Identification No. NV-0035, for permit issued to Sierra Pacific Power Company Tracey Substation Expansion Project, Permit No. AP4911-1504, issued August 16, 2005.

¹⁴⁶ U.S. EPA RACT/BACT/LAER Clearinghouse Identification No. OR-0041, Wanapa Energy Center, Permit No. R10PSD-OR-05-01, August 8, 2005.

Because both the average and incremental costs per ton of CO that would be reduced by imposition of a CO limit below 2.0 ppm are significantly higher than the costs that have been or would be required at other similar facilities, the Air District is not requiring that level of control as BACT. Although it appears that an additional reduction below 2.0 ppm may well be feasible based on permits that have been issued to other facilities, the Air District would eliminate it as a BACT requirement in Step 4 of the Top-Down BACT analysis because it is not “achievable” for purposes of a BACT analysis taking into account cost/economic impacts.

The Air District published the revised analyses outlined above in the Additional Statement of Basis, and received several additional comments during the second comment period. One set of comments asserted that the District had not adequately explained why a CO limit of less than 2.0 should not be required as BACT based on the Kleen Energy permit and CPV Warren permits. These comments cited passages from the NSR Workshop Manual about how a BACT determination must be justified, and stated that the District has not adequately explained why it is not proposing a CO limit of less than 2.0 based on those permits. These comments also stated that the mere fact that those facilities have not yet been built and thus have no operating data to show whether the lower limits are achievable is not a sufficient basis on which to conclude that the limits are not in fact achievable. These comments also objected to the Air District’s observation that there appears to be a consensus forming among PSD permitting agencies that 2.0 is an appropriate BACT limits for sources such as this one.

In response to these comments, the Air District disagrees that the Kleen Energy and CPV Warren permits require that the BACT limit must be less than 2.0 ppm for this facility. The Air District agrees with the assertion that a BACT determination must be justified based on technical analysis and evidence, but points out that it has fully justified its determination that 2.0 ppm is in fact the appropriate BACT limit for this facility, as discussed above and in the Additional Statement of Basis at pp. 47-49. The Air District also agrees that the mere fact that a facility has not been built is not enough evidence on which to conclude that the permit limits for the facility are not appropriate elsewhere, but the fact that Kleen Energy and CPV Warren have not yet been built was not the basis for the Air District’s determination. To the contrary, the Air District cited the fact that those facilities have not been built simply to point out that there is not operating data available for them and so the Air District needs to look to other sources of information regarding whether a limit below 2.0 ppm would be appropriate in this particular case. (See Additional Statement of Basis at pp. 47-48.) The Air District did undertake such an analysis in this case, and found that a lower limit below 2.0 ppm should not be required as BACT because of the relatively low cost-effectiveness of a lower limit compared to controls that are required as BACT at other similar facilities. It was this cost-effectiveness analysis that led the Air District to conclude that a limit below 2.0 was not warranted here, not the fact that the Kleen Energy and CPV Warren facilities have not been built. Finally, the Air District continues to believe that there is a developing consensus among permitting agencies that in most instances 2.0 ppm is the appropriate BACT limit for CO, based on the large majority of recent permitting decisions using a 2.0 ppm BACT limit.¹⁴⁷ The Air District’s BACT determination was made based on a specific

¹⁴⁷ Notably, EPA Region 9 – the EPA Region on whose behalf the Air District issues PSD permits – recently concluded that 2.0 ppm constitutes BACT for a similar facility in King’s

evaluation of the appropriate limit for this facility, however, and a determination that a lower limit below 2.0 ppm would not be sufficiently cost-effective compared with the kinds of control requirements are imposed at other facilities.

Another set of comments the Air District received during the second comment period concerned the cost-effectiveness comparisons the Air District made with other similar facilities. Some of the comments criticized the District's comparison of the cost of imposing a limit below 2.0 ppm with the South Coast and San Joaquin Valley air districts' CO cost-effectiveness thresholds. The comments stated that the South Coast's threshold is established for minor source BACT determinations and is not relevant for permitting major source PSD permits. The comments also stated that the San Joaquin Valley air district is not an approved PSD permitting authority and that its cost-effectiveness threshold would not be allowed if the agency were to do PSD permitting.

Other comments on this issue criticized the District's comparison with CO BACT determinations made by other permitting agencies. These comments stated that the determinations that the District cited were situations where the agencies found that CO controls would be cost-effective, and so they are examples of costs that would be justified but do not set a ceiling on how high costs would have to be before they are not justified. The comments also cited a 2000 BACT determination for the Sithe Heritage facility in Scriba, NY, finding that \$3,412 per ton was justifiable but stating that costs of over \$6,000 per ton would not be justifiable; and a 2002 survey from the Air and Waste Management Association ("AWMA") finding that average cost-effectiveness of CO controls required in Arkansas was \$3,373 per ton and in Michigan was \$4,944 per ton. The comments also noted that for other pollutants, cost-effectiveness thresholds in the range of \$5,000 to \$10,000 have been established (although they noted that cost-effectiveness considerations are pollutant-specific, so other pollutants do not necessarily provide a precedent). The comments stated that the District should analyze further whether a CO limit below 2.0 ppm should be required as BACT using a different threshold for considering cost-effectiveness.¹⁴⁸

The Air District disagrees with these comments that the cost-effectiveness of the more stringent CO limit in this case – \$16,000 per ton of additional CO prevented compared with a 2.0 ppm limit, and \$4,500 per ton of CO prevented in total – warrants imposing a BACT limit below 2.0 ppm. With respect to the San Joaquin Valley air district's threshold, the Air District disagrees that it makes any material difference that the San Joaquin Valley district does not have delegated

County, CA. *See* EPA Region 9, Avenal Energy Project (SJ 08-01), Prevention of Significant Deterioration Permit, Proposed Permit Conditions, EPA Docket ID No. EPA-R09-OAR-2009-0438-0001, June 2009, p. 6.

¹⁴⁸ The Air District also received a comment stating that it had not made clear what the costs associated with additional CO control would be. The Air District disagrees with this comment, and notes that it has published all of the cost information on which it based its assessment. All of that information was set forth in the spreadsheets on which the cost-effectiveness analysis was based, which were clearly cited in the footnotes supporting the cost-effectiveness summary (*see* Additional Statement of Basis at p. 45 and footnotes cited therein) and were made available for public review during the second comment period.

PSD permitting authority. That agency's BACT requirement is set forth in its non-attainment NSR program and reflects a level of control that is at least as stringent as BACT required for PSD permitting purposes.¹⁴⁹ The Air District therefore continues to consider that agency's threshold as instructive in determining how to analyze cost-effectiveness.¹⁵⁰ As for the South Coast's threshold, the comments correctly note that it applies for non-major facilities, but it is the only cost-effectiveness threshold the agency has. For major facilities the South Coast does not take cost into consideration at all,¹⁵¹ and so the major facility context would not be an appropriate comparator when trying to establish how to apply a PSD permit analysis that explicitly considers costs in the BACT review. The non-major context is the only appropriate comparison that can be made if one wants to examine how that agency evaluates cost-effectiveness of imposing additional air pollution controls. For these reasons, the Air District disagrees that its comparison with these two other California air districts was flawed. Although the comparisons are not perfect because they do not involve the exact same PSD permitting situation, they are still valid to the extent that they show what level of costs other agencies consider appropriate when balancing costs against additional emissions reductions, as the Air District is required to do here. The Air District also notes that these agencies' thresholds are also in line with the Yolo-Solano Air Quality Management District's threshold of \$300/ton for CO, which further supports the use of a threshold in this cost range as an indicator of other agencies' practices in this area.¹⁵²

Regarding the additional cost-effectiveness data points cited in the comments – \$3,412/ton from the 2000 Sithe Heritage BACT determination and the \$3,373/ton and \$4,944/ton numbers cited in the 2002 AWMA survey for Arkansas and Michigan, respectively – the Air District disagrees that these examples require the Air District to impose a lower CO limit here. First, the determinations the District relied on in its comparison were considerably more recent than the examples cited in the comments, being from 2005-2007 instead of 2000-2002. Furthermore, for the AWMA survey, the survey data indicate that BACT determinations can vary significantly from state to state. But the survey does not provide any information on how BACT determinations have been conducted in California, the state where this facility will be located; and with respect to the CO cost-effectiveness analysis, it provides data from only two out of the

¹⁴⁹ See San Joaquin Valley Air District Rule 2201, Section 3.9.

¹⁵⁰ The comments also stated that the San Joaquin Valley's threshold is not a true cost-effectiveness calculation but a "marginal" cost-effectiveness measure that looks only at the incremental costs and benefits involved in reducing emissions from the district's regulatory requirements to a proposed more stringent level of control. But to the extent that this is true, and the San Joaquin Valley thresholds are for incremental cost-effectiveness, that would just make the cost-effectiveness for this project even more outside the range of what San Joaquin Valley would require. The incremental cost-effectiveness of a lower CO limit here is \$16,000 per ton, which is over 50 times greater than the San Joaquin Valley threshold.

¹⁵¹ See South Coast BACT Guideline document, *supra* note 143, at p. 17.

¹⁵² See Final Staff Report, Update to Rule 2201 Best Available Control Technology ("BACT") Cost-Effectiveness Thresholds, San Joaquin Valley Air Pollution Control District (May 14, 2008), at p. 4 (available at www.valleyair.org/busind/pto/bact/May%202008%20updates%20to%20BACT%20cost%20effectiveness%20thresholds.pdf) (surveying cost-effectiveness thresholds for various California air districts).

50 states.¹⁵³ The survey is therefore far from a conclusive determination of what cost-effectiveness threshold the Air District should apply here. Moreover, even viewed as conservatively as possible, it merely confirms that an average cost-effectiveness of \$4,500 per ton is on the higher end of the range of reported averages from two other states. It does not lead the Air District to conclude that it must require more stringent emissions limits at this level of cost-effectiveness.

Moreover, to get a more comprehensive and recent understanding of what CO cost thresholds are being used in permitting analyses by other agencies, as well as to evaluate analyses where CO control measures have been rejected on cost-effectiveness grounds, the Air District also examined a database of other combustion turbine permitting decisions from around the country maintained by EPA Region 4. This database lists over 800 combustion turbine plants and provides information about how they were permitted and what control technology they use. For many of the plants, the database also provides information about the costs of control technologies that were not selected. The database lists many projects where CO control measures were rejected where they had a cost-effectiveness of less than \$2,000 per ton.¹⁵⁴ Based on this review, the Air District disagrees with the comments that a lower CO limit should be required at a total cost-effectiveness of \$4,500 per ton based on the small number of examples cited in the comments. A more comprehensive review shows that rejecting CO controls at that cost-effectiveness level is the norm among permitting agencies, not the exception.

Finally, with respect to cost-effectiveness thresholds that have been established for other pollutants, the comments are correct that cost-effectiveness is addressed on a pollutant-specific basis. For other pollutants besides carbon monoxide, a greater amount of cost can be justified, because the Bay Area is attainment of all applicable state and federal air quality standards for carbon monoxide, whereas it exceeds applicable standards for other pollutants. The Air District therefore disagrees that the examples from other pollutants have much bearing on the CO cost-effectiveness question, as the comments appear to recognize.

For all of these reasons, the Air District disagrees with these comments that it should require a CO limit below 2.0 ppm based on the additional costs that would be involved in achieving such a limit.

¹⁵³ Comparison of the Most Recent BACT/LAER Determinations for Combustion Turbines by State Air Pollution Control Agencies, Nishat H. Hydari, Adeel A. Yousef and Dr. Howard M. Ellis, QEP, Paper # 42752, Air and Waste Management Association (AWMA) Meeting June 2002.

¹⁵⁴ See EPA Region 4, "National Combustion Turbine List," available at www.epa.gov/region4/air/permits/national_ct_list.xls. Projects rejecting CO control measures at less than \$2,000 per ton include Tenaska Alabama IV Partners (rejecting Catalytic Oxidation at \$1506/ton CO); Calpine Blue Heron Energy Center (rejecting Catalytic Oxidation at \$1553/ton CO); Columbia Energy (rejecting Catalytic Oxidation at \$1611/ton CO); Santee Cooper Rainee Generating Station (rejecting Catalytic Oxidation at \$1717/ton CO); Reliant Energy Cardinal Woods River Refinery (rejecting Catalytic Oxidation at \$1993/ton CO); and Mid America Cordova Energy Center (rejecting Catalytic Oxidation at \$1307/ton CO).

Comment V.2. – Collateral Environmental Impacts Comparison Between Different Types of Oxidation Catalysts:

The Air District also received comments claiming that different types of oxidation catalysts will have different impacts on HAP and POC emissions, citing a 2002 EPA memorandum regarding HAP emissions from combustion turbines (“Roy Memorandum”).¹⁵⁵ The comments claimed that the SCONOx system reduces VOCs and HAPs while also reducing CO emissions. The comments claimed that the District should evaluate the differences between different types of oxidation catalysts in its CO BACT analysis.

Response: The Air District disagrees that there is evidence that different kinds of oxidation catalysts will have different impacts on HAP and POC emissions. The memorandum the comment relies on does not state that different oxidation catalysts will have different impacts on HAP and POC emissions. To the contrary, the memorandum (including its attachment) identify several specific types of catalysts, such as platinum, palladium, rhodium, and metal oxides, and discusses them all generally simply as “oxidation catalysts”. (See Roy Memorandum at p. 6.) Moreover, the memorandum does not claim that SCONOx has any different impact on HAP or POC emissions than any other type of oxidation catalyst. To the contrary, it explicitly states that the two technologies are “comparable” in this regard, and in fact bases its evaluation of all oxidation catalysts generally on an evaluation of SCONOx. (See *id.* at p. 1.) The only difference the memorandum points out between the two technologies is that SCONOx uses a chemically modified catalyst so that the catalyst also removes NOx. (See *id.*) For the Russell City Energy Center, the District is approving SCR for NOx control, and so the NOx-removal aspect of SCONOx does not provide any improvement over the combination of SCR for NOx control and an oxidation catalyst for CO control. The Air District is unaware of any studies on different types of oxidation catalysts and associated abatement efficiencies for VOCs and HAPs, and has found nothing in this comment or elsewhere that warrants revising the BACT analysis for CO. The Air District published this further justification and analysis in the Additional Statement of Basis, and did not receive any further public comment on this issue.

Comment V.3. – Carbon Monoxide Limits for Startups:

The Air District also received comments questioning whether the Carbon Monoxide permit limits will be appropriate for days when turbine startups occur.

Response: The District proposed and is finalizing BACT permit limits both for normal operations and for startups. Startup issues are discussed below in response to comments on startups. Short-term emission limits will be specific to startup operations, as startups by their nature involve more carbon monoxide emissions. Daily and annual limits will include all facility emissions, including emissions from startups. The carbon monoxide limits in the permit will be appropriate for days when turbine startups occur.

¹⁵⁵ The memorandum cited is available at www.epa.gov/ttn/atw/combust/turbine/cttech8.pdf.

VI. PARTICULATE MATTER ISSUES

The Air District also received a number of comments on Particulate Matter issues during both public comment periods. The Air District received comments in the first comment period, and then revised its proposed particulate matter limits in the August, 2009, draft permit and Additional Statement of Basis. The Air District then received further comments in the second comment period. The District is finalizing the particulate matter limits it proposed in the August, 2009, draft permit. The District responds to all of the comments it received on particulate matter issues in both comment periods in this section.

Comment VI.1. – Applicability of PSD Permitting Requirements for Fine Particulate Matter (PM_{2.5}):

The Air District received a number of comments about the evolving federal regulatory landscape regarding fine particulate matter with a diameter of less than 2.5 microns (“PM_{2.5}”), and whether the Air District is required to conduct a PSD review for PM_{2.5}. EPA has promulgated National Ambient Air Quality Standards (“NAAQS”) for PM_{2.5}, setting standards for 24-hour average ambient concentrations and annual average ambient concentrations. Until recently, the San Francisco Bay Area was administratively designated as “attainment/unclassifiable” for these standards, making the region subject to the PSD permit requirements of the Federal Clean Air Act and 40 C.F.R. 52.21 for PM_{2.5}. The EPA Administrator signed a document designating the Bay Area as non-attainment of the 24-hour standard on December 18, 2008, but the document was never published in the Federal Register and so the designation did not become legally effective, leaving the Bay Area technically still designated as attainment/unclassifiable. The current EPA administrator then signed a second document designated the Bay Area as non-attainment of the 24-hour standard, which has been published in the Federal Register and became effective December 14, 2009. As a result, the Bay Area is now a non-attainment area for the 24-hour PM_{2.5} standard, making it subject to Non-Attainment NSR permitting and removing it from the realm of PSD permitting for that pollutant. Throughout most of this permit proceeding, however, the Bay Area was still classified as “attainment/unclassifiable”.

The Air District has tracked this evolving regulatory landscape during this permitting proceeding. When the Air District issued its initial Statement of Basis, the Bay Area was still designated attainment/unclassifiable for PM_{2.5}. At the time, EPA’s regulations required the District to address PM_{2.5} issues in PSD permitting by relying on its PM₁₀ analysis as a surrogate for ensuring compliance with PM_{2.5} requirements (“surrogate policy”). Based on its PM₁₀ analysis, the Air District therefore concluded in the initial Statement of Basis that the facility would satisfy PSD requirements for PM_{2.5} as well. During the first comment period, the Air District received a number of comments criticizing its reliance on this surrogate policy, as well as criticizing the policy itself as being illegal. Comments stated that reliance on the surrogate policy was optional for state agencies. Some comments implied that the surrogate policy should not apply for this facility by implying that the permit application was not submitted before the July 15, 2008, expiration date that EPA established for the policy. Comments stated that the surrogate policy was inappropriate where the Bay Area was not in attainment of the PM_{2.5} NAAQS, and when the non-attainment designation becomes effective the District will be required to address PM_{2.5} pursuant to 40 C.F.R. Part 51, Appendix S. These comments stated that the District should proceed to address PM_{2.5} even before the designation becomes effective,

and implied that doing so would require the facility to use LAER and provide offsets for PM_{2.5} and identified precursors. Some comments claimed that the permit should be denied because the Bay Area is not in attainment of the PM_{2.5} standard, and claimed that permitting any new PM_{2.5} source would be inconsistent with the Air District's other regulatory initiatives to reduce PM_{2.5} pollution. Other comments stated that the Air District should explain the PM_{2.5} regulatory context better to help the public understand what is going on.

Response: Subsequent to the initial Statement of Basis and first comment period, EPA issued a stay of the surrogate policy under 40 C.F.R. 52.21(i)(1)(xi) and proposed to repeal it.¹⁵⁶ In response to this change in EPA policy, the Air District declined to use the surrogate policy, as requested by many of the comments. The Air District then went ahead and included PM_{2.5} issues directly in its PSD permitting review. PSD permit analysis requires the Air District (i) to demonstrate that the facility will use Best Available Control Technology to control PM_{2.5} emissions; and (ii) to conduct an Air Quality Impact Analysis showing that the facility will not contribute to an exceedance of the PM_{2.5} NAAQS (either the 24-hour standard or the annual standard). The Air District conducted these analyses and published them in the August 2008 Additional Statement of Basis. The August 2008 Draft PSD Permit included proposed BACT conditions for PM_{2.5}, and the Additional Statement of Basis and supporting documents described Air Quality Impact Analysis for PM_{2.5}. This additional permitting analysis specific to PM_{2.5} was the Air District's response to the comments that the surrogate policy is inappropriate and illegal and that a PM_{2.5}-specific analysis is required.¹⁵⁷

At the time of the August 2008 Additional Statement of Basis, the Air District was aware that EPA would at some point be finalizing its designation of the Bay Area as not being in attainment of the 24-hour PM_{2.5} NAAQS. The Air District therefore put forward two alternative proposals, depending on whether the non-attainment designation became effective before a final decision was made on permit issuance. (See discussion in Additional Statement of Basis at pp. 52-55.) First, in the event that the non-attainment designation did not become effective, the facility would remain subject to PSD permit requirements. In that case, the Air District proposed issuing a PSD permit covering PM_{2.5}, along with the other PSD pollutants, based on the PSD analysis in

¹⁵⁶ The granting of reconsideration and the issuance of the stay were made by letter from the EPA Administrator dated April 24, 2009, and in a subsequent Federal Register Notice dated June 1, 2009 (74 Fed. Reg. 26098).

¹⁵⁷ The Air District disagrees that no permits should be issued as a result of the fact that ambient air in the Bay Area is not in compliance with the PM_{2.5} NAAQS (24-hour). The Clean Air Act's permitting programs are set up to address concerns about compliance with these standards through appropriate permit conditions and permitting analyses. For areas that are not in compliance with an applicable NAAQS, the Clean Air Act's Non-Attainment NSR permitting requirements apply, which require all major new facilities and major modifications to (i) achieve the Lowest Achievable Emissions Rate for the pollutant involved and (ii) provide offsetting emissions reductions from old sources that will make up for the new emissions from the new source or modification (among other requirements). These permitting requirements, along with the planning requirements and other requirements applicable in non-attainment areas, are designed to ensure that the NAAQS will be achieved in such areas, even if new facilities are permitted in the meantime.

the Additional Statement of Basis. Second, in the event that the non-attainment designation became effective before final decision on permit issuance, the facility would cease to be subject to PSD requirements for PM_{2.5} (at least as they relate to the 24-hour standard) and would instead become subject to EPA's non-attainment NSR permitting requirements in 40 C.F.R. Part 51, Appendix S. In that case, the Air District would leave the issue of PM_{2.5} permitting to Appendix S, at least as it relates to the 24-hour standard. (But note that the Appendix S requirements would not be applicable to this facility in any event because its PM_{2.5} emissions are below the Appendix S threshold of 100 tons per year.¹⁵⁸)

It is this latter scenario that has come to pass as of the time of final permit issuance: the Bay Area's non-attainment designation for the 24-hour standard became applicable December 14, 2009.¹⁵⁹ (The region remains attainment/unclassifiable for the annual standard, however, creating what the District refers to as a "split" attainment designation.) The Air District is therefore going ahead with the second proposed alternative in the final PSD permit. This alternative presents a further question, however, regarding whether the PSD permit must still satisfy PSD requirements for PM_{2.5} for the annual standard under the "split" attainment designation. In the Additional Statement of Basis, the Air District proposed to address this "split" attainment designation by including PM_{2.5} issues in the PSD permit with respect to the annual standard, since the region is still "attainment/unclassifiable" for the annual standard and PSD requirements apply in areas that are attainment/unclassifiable for a particular standard. The Air District solicited further input and comment from the public about whether this is the correct approach, or whether Non-Attainment NSR permitting under Appendix S supersedes PSD permitting such that facilities would be subject only to Appendix S permitting PM_{2.5}. The Air District did not receive any further comments during the second comment period objecting to its proposed approach. Air District staff did obtain an oral opinion from staff from EPA Region IX stating an opinion that Appendix S permitting supersedes PSD permitting for PM_{2.5}, but Region IX staff were not able to point to any definitive analysis to support this opinion as of the time of final permit issuance. The Air District is therefore conservatively assuming that PSD permitting for the annual standard remains in effect, at least until such time as it can be established that PSD permitting no longer applies for the annual standard in an area that has been designated as non-attainment for the 24-hour standard.

For these reasons, the Air District is treating PM_{2.5} as subject to the final PSD Permit with respect to the annual PM_{2.5} standard. This means that PM_{2.5} emissions are subject to BACT permit limits under 40 C.F.R. section 52.21(j). The Air District is including such limits in the

¹⁵⁸ Here, the facility is exempt from Appendix S because it will emit less than 100 tons per year of PM_{2.5}. (See 40 C.F.R. Appendix S, ¶ II.A.4(i)(a) (establishing 100 tpy threshold for regulation of Major Stationary Sources); see also Additional Statement of Basis at p. 55.) There are therefore no additional Clean Air Act regulatory requirements applicable beyond the PSD regulations, and no additional federal permit required beyond the PSD Permit. In addition, it is worth noting that if Appendix S were applicable here, any Appendix S requirements would be implemented through a Non-Attainment NSR permit, not through the PSD Permit.

¹⁵⁹ See Air Quality Designations for the 2006 24-Hour Fine Particle (PM_{2.5}) National Ambient Air Quality Standards, Final Rule, 74 Fed. Reg. 58688, 58709-11 (Nov. 13, 2009) (to be codified at 40 C.F.R. § 81.305).

final permit conditions as proposed in the August 2009 Draft Permit. (See Permit Conditions ¶¶ 19(h), 22(e), 23(e); see also Additional Statement of Basis at pp. 53-53 (discussing BACT analysis for PM_{2.5}).¹⁶⁰) This also means that the facility is required to show that it will not cause or contribute to an exceedance of the PM_{2.5} annual NAAQS or PSD increment. The Air District conducted such an analysis as described in the Additional Statement of Basis and supporting documentation, and found that it would not. (See Additional Statement of Basis at pp. 80-92.) Thus, to the extent that PSD requirements apply to sources of PM_{2.5} emissions in areas with “split” attainment designations for the annual and 24-hour NAAQS, this facility and this PSD permit satisfy those requirements.

In addition, beyond the issues of PSD applicability for PM_{2.5}, the Air District also received comments on the specific BACT limit it proposed for PM₁₀/PM_{2.5}, which are addressed in the remainder of this Section VI; and on its Air Quality Impact Analysis review with respect to PM_{2.5}, which are addressed in Section XIII below along with the other issues regarding the Air Quality Impact Analysis that have been raised in public comments.

Comment VI.2. – Regulating Ammonia Slip as a Precursor to the Formation of Secondary Particulate Matter:

The Air District received comments stating that it should undertake a BACT analysis for ammonia slip as a particulate matter precursor, based upon the potential for secondary PM formation. The comments claimed that permits for other facilities have been issued with lower ammonia slip limits. The comments questioned the Air District’s analyses in the Statement of Basis and Additional Statement of Basis finding that ammonia slip from the facility would not contribute to the formation of secondary particulate matter, suggesting that ammonia slip is in fact a significant contributor and should be therefore be subject to BACT. The comments suggested that the memorandum the District cited in support of its conclusion that the Bay Area is nitric-acid limited – on which the conclusion that ammonia will not cause significant secondary PM_{2.5} formation was in part based – was specific only to the San Jose and Livermore areas and cannot be used to support a determination for the Hayward area. The comments also stated that Air District staff were reevaluating the District’s conclusion that ammonia slip emissions do not contribute to secondary particulate formation as expressed in the earlier memorandum. The commenters claimed that a site-specific analysis of secondary particulate from ammonia slip is warranted in order to assess the potential for ammonia slip from this facility to contribute to secondary particulate matter formation. The comments also questioned the District’s statement earlier in the permitting process that the potential impacts of ammonia slip emissions on the formation of secondary particulate matter within the boundaries of the San Joaquin Valley Air Pollution Control District are not known. In general, the comments suggested that the Air District should subject ammonia emissions to the BACT requirement as a precursor to secondary PM_{2.5} formation.

¹⁶⁰ BACT is also required for NO_x as a precursor to secondary PM_{2.5} formation. The Air District addressed this requirement in the Additional Statement of Basis at p. 54 (noting that the NO₂ BACT analysis and conditions satisfies the BACT requirements for NO_x as a precursor). The Air District did not receive any comments on this issue, and it is therefore finalizing the permit as proposed with respect to this issue.

Response: EPA has addressed the issue of regulating ammonia as a precursor to particulate matter in its recent PM_{2.5} rulemaking. EPA established there that it presumes that ammonia is not a secondary particulate matter precursor and should not be included in the PSD BACT analysis. EPA did provide that states will have the discretion to include ammonia in particulate matter regulations when adopting their own SIP-approved NSR permitting programs, provided they can make a technical showing that ammonia will be a significant contributor to PM_{2.5} concentrations. But until that time, while states are applying EPA's rules for particulate matter, EPA has established that ammonia is not to be included in the permitting analysis as a precursor to secondary PM formation. This is clear from the definition of "Regulated NSR Pollutant" in 40 C.F.R. Section 52.21(b)(50)(i), which includes several precursors but specifically excludes ammonia.¹⁶¹ Based on this clear regulatory direction from EPA about what to include in a PSD BACT analysis for particulate matter, the Air District disagrees that it should or could apply BACT in this permit for ammonia based on the potential for secondary particulate matter formation.

Nevertheless, beyond these legal requirements excluding ammonia slip from federal PSD permitting, the Air District went ahead and examined the technical aspects of this issue further, both in response to these comments and because the District will need to consider whether ammonia should be included when it adopts Non-Attainment NSR regulations for PM_{2.5}. Secondary particulate matter formation is a complex process that is not fully understood at the present time. As EPA recently noted in its rulemaking on secondary particulate matter precursors, "[a]mmonia emission inventories are presently very uncertain in most areas, complicating the task of assessing potential impacts of ammonia emission reductions. In addition, data necessary to understand the atmospheric composition and balance of ammonia and nitric acid in an area are not widely available, making it difficult to predict the results of potential ammonia emission reductions."¹⁶² Given this situation, it is difficult at this time to state with any degree of certainty that ammonia slip from the facility may cause significant secondary particulate matter formation. It would therefore not be possible to impose a BACT requirement for ammonia slip at this time – even if EPA's regulations gave the District the discretion to do

¹⁶¹ EPA has established the same situation for Non-Attainment NSR permitting under Appendix S during the transition period while states are developing their own PM_{2.5} Non-Attainment NSR permitting programs. "Regulated NSR Pollutant" is similarly defined under Appendix S to exclude ammonia as a particulate matter precursor. (*See* 40 C.F.R. Part 51, Appendix S, § II.A.31.iii.) These regulatory definitions in EPA's rules governing its NSR program provide that ammonia should be excluded as a particulate matter precursor when these rules are used. These definitions contrast with the provisions for states to adopt their own SIP-approved Non-Attainment NSR and PSD programs, which allow for states to regulate ammonia as a particulate matter precursor if they can show that ammonia will significantly contribute to secondary PM formation. (*See* 40 C.F.R. 51.165(a)(1)(xxxvii)(C)(4) (providing that ammonia can be included as a precursor to secondary formation when states adopt their own permitting programs, upon sufficient showing).) These issues are discussed in more detail in EPA's preamble to its final rule, where EPA explains its intention that ammonia is not to be included in PSD permitting but can be included in states' own non-attainment NSR permit programs where appropriate. (*See* 73 Fed. Reg. 28321, 28330 & 28347-49 (May 16, 2008).)

¹⁶² 73 Fed. Reg. 28321, 28330 (May 16, 2008).

so – as EPA has made clear that it Federal PSD Permitting decisions should not be made based on potential impacts that are merely speculative in nature.¹⁶³ The Air District notes that the commenters’ assertions about the areas in which the District’s initial analysis could be made more comprehensive only highlight the uncertainties surrounding the issue of secondary Particulate Matter formation and the difficulty of concluding with any confidence that ammonia slip emissions from this facility will cause significant additional Particulate Matter impacts.

Furthermore, EPA has found countervailing considerations that would counsel against unnecessarily restricting ammonia slip emissions where it would not provide PM_{2.5} benefits, in that ammonia neutralizes harmful acids in the atmosphere. As EPA explained in its recent rulemaking, “[a]mmonia serves an important role in neutralizing acids in clouds, precipitation, and particles. In particular, ammonia neutralizes sulfuric acid and nitric acid, the two key contributors to acid deposition (acid rain).” EPA cited this trade-off between the potential benefits and drawbacks of ammonia restrictions, as well as the uncertainties surrounding the formation of secondary Particulate Matter from ammonia emissions, in excluding ammonia from Federal PSD regulation.¹⁶⁴ The Air District is mindful of these issues and declines to depart from EPA’s considered (and legally required) approach at this time, especially where there is no conclusive evidence that ammonia slip from this facility will be a significant contributor to Particulate Matter formation. The Air District will be examining these issues further as it adopts Non-Attainment NSR regulations to address PM_{2.5} and does not intend to foreclose the potential that it may determine to include ammonia in those regulations based on further investigation into the secondary impacts of ammonia emissions. But based on the available evidence at this time it cannot conclude with certainty that ammonia slip from this particular facility will be a significant contributor to secondary particulate matter formation.

The Air District also considered the comments critical of the District’s memorandum concluding that the Bay Area is nitric-acid limited and that additional ammonia emissions will therefore not cause significant additional secondary PM_{2.5} formation.¹⁶⁵ The Air District disagrees that the evidence it evaluated from the San Jose and Livermore areas should necessarily be discounted simply because those are different locations than Hayward, and the commenters have not provided any information from which to conclude that there may be more available nitric acid in the Hayward area and in San Jose or Livermore. But beyond the conclusions in 1997 memorandum, the Air District has been continuing to evaluate the science and available data on the issue of secondary PM_{2.5} formation, as alluded to in the comments. This further evaluation has generally confirmed (preliminarily at least) that the Bay Area is in fact nitric-acid limited – although it has shown that the secondary particulate formation mechanisms are highly complex and that the generalizations made in the 1997 memorandum the District relied on in the Statement of Basis and Additional Statement of Basis may in hindsight have been overly

¹⁶³ See *In re Three Mountain Power*, 10 E.A.D. 39, 57-58 (EAB 2001); see also *In re Sutter Power Plant*, 8 E.A.D. 680, 693-94 and n. 13 (EAB 1999).

¹⁶⁴ 73 Fed. Reg. 28321, 28330 (May 16, 2008).

¹⁶⁵ The memorandum at issue is the Sept. 8, 1997, Office Memorandum from D. Fairley to T. Perardi & R. De Mandel entitled “A first look at NOx/Ammonium nitrate tradeoffs” (hereinafter, “Ammonium Nitrate Memorandum”, discussed on pp. 26-27 of the Statement of Basis and pp. 55-56 of the Additional Statement of Basis.

simplistic. The focus of the Air District's further evaluation has been a computer modeling exercise designed to predict what PM_{2.5} levels will be around the Bay Area, given certain assumptions about emissions of PM_{2.5} and its precursors, about regional atmospheric chemistry, and about prevailing meteorological conditions. This information was used to create a computer model of regional PM_{2.5} formation in the Bay Area from which predictions can be drawn about how emissions of PM_{2.5} precursors will impact regional ambient PM_{2.5} concentrations. The Air District's report on its computer modeling exercise has not been finalized, but the draft report concludes that regional ammonium nitrate buildup is limited by nitric acid, not by ammonia.¹⁶⁶ The draft report does find that the amount of available nitric acid is not uniform but varies in different locations around the Bay Area, and consequently the potential for ammonia emissions to impact PM_{2.5} formation varies around the Bay Area. Specifically, according to the draft report, the model predicts that a reduction of 20% in total ammonia emissions throughout the Bay Area would result in changes in ambient PM_{2.5} levels of between 0% and 4%, depending on the availability of nitric acid, leaving open the potential that ammonia restrictions could form a useful part of a regional strategy to reduce PM_{2.5}.¹⁶⁷ The draft report therefore restates the general conclusion from the 1997 "first look" memorandum that the Bay Area is nitric-acid limited, although it finds that reductions in the region's ammonia inventory could potentially achieve reductions in PM_{2.5} concentrations in areas that may have sufficient available nitric acid.¹⁶⁸ (The draft report cautions that its assumptions regarding the availability of nitric acid may be misleading, however, because of the preliminary nature of the ammonia emissions inventory used for modeling – a concern cited by EPA in excluding ammonia from PSD permitting.) Notably, the model predicts that Hayward area, like the Livermore and San Jose areas, has among the lowest levels of available nitric acid in the entire region, in the vicinity of 0.25 ppb or less.¹⁶⁹ This last finding suggests that the study from the 1997 "first look" memorandum regarding the Livermore and San Jose areas would be useful in assessing the situation in the Hayward area.

The Air District also used this model to attempt to estimate what the secondary particulate matter impacts would be from the Russell City facility. That analysis is discussed in connection with the PSD source impact analysis for this facility in Response to Comment No. XIII.B.3. below. As discussed there, the computer model predicted that emissions of all secondary particulate precursors from the facility will have a maximum additional impact on ambient PM_{2.5} levels of 0.11 µg/m³, which is not a significant additional impact given the relative size of the direct PM_{2.5} impact and background levels in the area.

Thus, after evaluating this issue further based on all of the evidence before it, the Air District continues to conclude that the evidence at this stage shows that additional ammonia emissions from the Russell City facility will not make a significant additional contribution to secondary PM_{2.5} formation. The Air District therefore continues to conclude that it would not be

¹⁶⁶ See BAAQMD, Draft Report, *Fine Particulate Matter Data Analysis and Modeling in the Bay Area* (Draft, Oct. 1, 2009), at p. E-3 & p. 30. The Air District anticipates issuing a final report shortly.

¹⁶⁷ See *id.* at pp. E-3 – E-4.

¹⁶⁸ See *id.* at p. 30.

¹⁶⁹ See *id.*, Figure 17, p. 31.

appropriate to subject this facility to a BACT requirement for ammonia slip at this time, even if the federal PSD regulations did not prohibit it.

Finally, with respect to the comment regarding potential secondary particulate matter formation in the San Joaquin Valley from ammonia slip emissions from the proposed project, nothing in the comments suggests that Russell City facility will have any such impacts. First, there is little indication that ammonia emissions from Russell City could even reach the San Joaquin Valley in any significant amount. Moreover, the available evidence suggests that secondary PM_{2.5} formation in the San Joaquin Valley is at least as limited by the lack of nitric acid, given the large amount of ammonia emissions associated with agricultural operations there. The Air District's computer model shows virtually zero available nitric acid there,¹⁷⁰ and at least one independent studies has reached the same conclusion.¹⁷¹ Any ammonia emissions that did manage to reach the San Joaquin Valley would therefore not have anything to react with to form PM_{2.5}. For all of these reasons, the Air District finds this issue irrelevant to the question of whether ammonia slip from the Russell City facility should be subject to the BACT requirement.

For all of these reasons, the Air District has concluded that the Federal PSD BACT requirement does not require an analysis of ammonia slip emissions facility based on the potential for secondary PM_{2.5} formation. The Federal PSD regulations specifically exclude ammonia from the PSD BACT requirement for PM_{2.5}; and in any event, the available evidence at this time is not developed enough to show that the ammonia emissions from this particular facility would be likely to contribute significantly to secondary PM_{2.5} formation.

Comment VI.3. – Particulate Matter BACT Limit For Gas Turbines/HRSGs:

The Air District did not receive any significant comments on the Particulate Matter limits it proposed in the December 2008 Draft Permit during the first comment period. The Air District nevertheless reviewed the proposed limits of its own volition after the first comment period ended and determined that lower limits would be appropriate. As explained in the Additional Statement of Basis, based on further review of additional information, the Air District determined that a revised limit on Particulate Matter emissions from each gas turbine and heat recovery boiler train of 7.5 lb/hr would be appropriate. This emissions limit would include all filterable and condensable particulate emissions (*i.e.*, “front” and “back” half, respectively). This revised limit was based on a review of additional source testing data from a number of similar combined-cycle facilities, which showed average particulate emissions of 4.58 lb/hr, with a high of 10.65 lb/hr.¹⁷² The Air District concluded that some of the higher test results may be

¹⁷⁰ *Id.*

¹⁷¹ See Betty K. Pun & Christian Seigneur, Sensitivity of PM Nitrate Formation to Precursor Emissions in the California San Joaquin Valley, (Apr. 9, 1999) at pp. 2-4 (cited in *In re Three Mountain Power*, 10 E.A.D. at n. 22).

¹⁷² Each source test result represents the average of multiple test runs (3 in most cases) performed on the same unit. For a summary of the source test results, see spreadsheet, “Summary of Filterable PM₁₀”, submitted by B. McBride (Director, Environment, Health and Safety, Calpine Corporation) to B. Bateman (Director, Engineering/Toxic Evaluation, Air District), W. Lee (Senior AQ Engineer, Engineering/Permit Evaluation, Air District) and B.

attributed to anomalies in the testing and analytical methods, the influence of which may be mitigated by application of more rigorous quality assurance/quality control (“QA/QC”) by the testing contractor or analytical laboratory. The Air District therefore concluded that it would not be appropriate to establish a compliance margin that would accommodate these high test results. Instead, the Air District discounted the highest 5% of the test results (4 of the 73), and concluded that a permit limit based on the remaining 95% would provide an appropriate compliance margin. This approach yields a permit limit of 7.5 lb/hr. The Air District also reviewed available permits for other similar facilities and did not find any lower permit limits. For these reasons, the Air District concluded that the appropriate BACT limit for PM₁₀/PM_{2.5} for each gas turbine/heat recovery boiler train should be 7.5 lb/hr. The Air District also revised its proposed conditions for the daily and annual Particulate Matter limits accordingly.

The Air District published this revised BACT analysis and proposed limits in the Additional Statement of Basis, and received a number of comments on these issues during the second comment period. Some comments stated that the Air District had not adequately justified the revised proposed limit of 7.5 lbs/hr. These comments noted that the data on which the District relied showed PM emissions at other similar sources between 4.58 and 10.65 lb/hr, and that the District derived the 7.5 lbs/hr proposed permit limit because 95% of the data points were below that level and only 5% of the data points exceeded it. The comments stated that the District did not adequately explain why it chose the 95% cutoff level. The comments also stated that some facilities that the District evaluated showed emissions well below the 7.5 lb/hr proposed limit. The comments also criticized the Air District for using data from existing facilities in its BACT analysis, implying that new facilities should be able to achieve particulate limits lower than the performance of existing facilities. Some comments also stated that a facility proposed for Carlsbad will emit only 39 tons per year of PM, compared with 71.8 tons for Russell City.¹⁷³

Nishimura (Supervising AQ Engineer, Engineering/Permit Evaluation, Air District), by email dated June 10, 2009.

¹⁷³ The Air District also received a communication after the close of the comment period stating that the Blythe facility has a lower PM₁₀ limit and that the Russell City limit should also be lower. Since this communication was not received during the comment period, it does not constitute a formal public comment and the Air District is therefore not obligated to respond to it. The Air District has nevertheless reviewed the Blythe permit, which has a 6 lb/hr limit. The Air District notes, however, that the turbines at the Blythe facility are smaller than the Russell City turbines, and when size is taken into account the Russell City limit is effectively the same as the Blythe limit. The Blythe turbines are Siemens V84.3A combustion turbines rated at 1776 MMBtu/hr each. Russell City, by contrast, will have a capacity of 2238.6 MMBtu/hr per turbine/HRSG train. (*Compare* Blythe PSD Permit (EPA Region IX, “Authority to Construct Issued Pursuant to Prevention of Significant Deterioration (PSD) Requirements at 40 CFR § 52.21”, PSD Permit Number SD 02-01, April 25, 2007, EPA Docket ID No. EPA-R09-OAR-2007-0723-0001), at p. 2 and p. 6, Condition D.2., *with* Russell City PSD Permit, Condition 19. Note that the Blythe PSD permit limit applies only to the turbines, whereas the Russell City limit applies to the turbine and HRSG duct burners.) When this size differential is taken into account, both of these permit limits allow for the emission of 0.003 pounds of PM per MMBtu of fuel consumed. Moreover, it appears that the 6 lb/hr limit was intended to apply as a 3-hour average, based on the CEC’s analysis. Emissions in pounds per hour were estimated at between 6.4 and

Response: Particulate matter emissions from gas turbines vary considerably, based on a number of factors including the levels of sulfur and particulates in the natural gas the turbines burn and the amount of particulates entrained in the combustion air. Moreover, source test results can also vary considerably from test to test, in part because the standard test method, EPA Method 201A/202, was designed to measure higher particulate levels than are emitted by gas turbines. This high degree of variability among particulate matter emissions is evident from the test results the Air District reviewed. (See discussion in Additional Statement of Basis at pp. 51-52 and fn. 98.) The BACT limit must be established at a level that can accommodate this variability so that it is achievable by the facility. The Air District therefore established the proposed BACT limit at 7.5 lb/hr as the most stringent emissions rate that will actually be achievable, consistent with the BACT requirement. The Air District disagrees with the comments that this is an inappropriate method for establishing a BACT limit, and in particular disagrees that the limit must be set at the lowest emissions rate ever seen in a test result, or at the average emissions rate seen in a group of test results. To the contrary, the BACT limit must be established at a level that can accommodate all reasonably foreseeable operating and testing scenarios, and the Air District's PM limit does that based on all available evidence. The Air District also disagrees that it has not adequately explained how it arrived at the 7.5 lb/hr BACT limit, as the discussion in the Additional Statement of Basis, as expanded upon herein, clearly explains the source test results the Air District reviewed and the way the Air District used the 95th percentile level as a way to arrive at a BACT limit that the most stringent that will be achievable by the facility.

The Air District also disagrees with the comments that it should not rely on test results from existing facilities. Test results from facilities that are built and actually operating are an appropriate means to establish the emissions rate that current technology can achieve. Obviously, if there are indications that new technology that is available but has not actually been built and operated yet can achieve even lower emissions, that information would support imposing an even more stringent limit that what is achievable by facilities that have been built and are actually operating. But the comments did not provide any information about any such new technologies, and the Air District is not aware of any. The Air District therefore concludes that the emissions rates achieved by existing sources that the Air District reviewed are an appropriate basis for establishing the BACT limit.

With respect to the comments about the particulate matter limit for the proposed Carlsbad facility, as noted above in response to Comment IV.C.3. regarding the Carlsbad NO_x limits, the reason why that facility will have lower annual emissions is that it will operate for only up to 4100 hours per year, whereas Russell City is permitted for operation all year long. The Air District reviewed the proposed Carlsbad particulate matter limit and found it to be 9.5 pounds per

7.6. (See CEC Final Staff Assessment, Air Quality Table 6, p. 4.1-17, *available at* www.energy.ca.gov/2005publications/CEC-700-2005-007/CEC-700-2005-007.PDF.) The Air District therefore disagrees that the Blythe facility would provide a basis on which to impose a lower BACT limit for particulate matter. In addition, the facility has not yet been built so there is no test data available to indicate whether the facility is capable of achieving compliance with its permit limit.

hour, which is higher than the 7.5 pounds per hour the Air District is imposing here.¹⁷⁴ The Air District therefore disagrees that the Carlsbad facility warrants a lower particular matter limit.

Finally, the Air District also received communications outside of the formal comment period from power plant owner/operators who questioned whether a limit of 7.5 pounds per hour would be achievable over all operating scenarios. These interested parties stated that equipment manufacturers will not guarantee emissions performance at 7.5 pounds per hour. They also noted that some of the test results showed emissions above 7.5 pounds per hour, and stated that as an enforceable not-to-exceed permit condition the BACT limit needs to be set at a level that can accommodate all such test results. They stated that the Air District should not establish a BACT limit at less than 9.0 pounds per hour. The Air District acknowledges these points and is considering them, but ultimately does not need to make a definitive determination in response because the project applicant is willing to accept the 7.5 pound-per-hour permit limit. The Air District understands that equipment manufacturers will not guarantee emissions below 9.0 pounds per hour. Vendor guarantees are one important indicator of what emissions performance level is achievable for a BACT analysis, although the presence or absence of a vendor guarantee is not by itself determinative.¹⁷⁵ The Air District is also fully aware that some of the test results it review showed emissions above 7.5 pounds per hour, as discussed in the Additional Statement of Basis. The Air District agrees that the BACT limit needs to be established at a level that is achievable under all operating scenarios, but does not agree that a small number of test results over 7.5 pounds per hour necessarily means that a 7.5 pound-per-hour limit cannot be found to be achievable for purposes of BACT. The Air District is investigating these test results further to develop more information on this issue. It may be that the high test results were due to inherent uncertainties in the test method as discussed above, or because of upsets in facility operation that led to excessive particulate matter. Alternatively, it may be that the equipment cannot in fact ensure emissions below 7.5 pounds per hour under all foreseeable circumstances. The Air District will continue to evaluate this issue going forward. But for purposes of the Russell City permit, the District does not need to make a final determination of whether BACT for this type of equipment should be 7.5 pounds per hour, 9.0 pounds per hour, or some number in between. The project applicant has agreed to accept a permit limit of 7.5 pounds per hour, and that limit meets or exceeds BACT.

Comment VI.4. – Particulate Matter BACT Analysis for Cooling Tower:

The Air District also conducted a similar review of the BACT limits for particulate matter emissions from the cooling tower. As noted in the initial Statement of Basis, the cooling tower can contribute to particulate matter emissions through solids dissolved in the water used in the cooling system, which can be emitted in the water vapor exhausted through the cooling tower. Although the Air District did not receive any comments on the cooling tower limits during the initial comment period, the Air District conducted its own further analysis of Total Dissolved Solids (“TDS”) data from the source of the proposed facility’s cooling water, the City of Hayward’s Waste Water Treatment Plant, which is adjacent to the proposed facility. Based on this analysis, the Air District concluded that the facility should be able to keep the TDS of the cooling water at 6200 ppm or below. The Air District therefore revised its proposed BACT limit for TDS downward from the initial 8000 ppm limit to a revised more stringent 6200 ppm limit.

¹⁷⁴ Carlsbad Energy Center FDOC, *supra* note 134, at p. 8 Table 1a.

¹⁷⁵ See NSR Workshop Manual at p. B.20.

The Air District published this revised proposed BACT limit in the Additional Statement of Basis and invited further public comment. The Air District did not receive any further comments on the numerical TDS standard it proposed as the BACT limit. The District did, however, receive comments suggesting that it should be requiring the facility to use a dry cooling system instead of a wet cooling system as the BACT technology choice. These comments cited statements by the District in other contexts where the District noted that wet cooling involves fine particulate matter impacts and that dry cooling is preferable in this regard.¹⁷⁶

Response: The Air District agrees that dry cooling systems are preferable in general from a criteria air pollution perspective because they do not have the particulate emissions that can result from wet cooling. In reviewing these comments about requiring a dry cooling system here, however, the Air District has been mindful that it cannot require an applicant to redesign its facility in a manner that alters inherent design elements or changes a fundamental purpose of the facility. Here, this facility was specifically designed from the very beginning to make use of recycled water from the City of Hayward wastewater treatment plant.¹⁷⁷ A central element of the project design is a tertiary treatment plant that will utilize the City’s wastewater effluent and clean it further to enable it to be used for cooling purposes.¹⁷⁸ The benefit of being able to recycle the City’s wastewater was also one of the reasons the City cited in agreeing to a property exchange that allowed the applicant to go forward with the project at its current location.¹⁷⁹ And the Energy Commission explicitly found that the ability to use recycled wastewater was an objective of the project when it initially approved the facility.¹⁸⁰ The use of a wet cooling system taking advantage of the City’s wastewater is thus clearly an integral design element of the project. Moreover, it has clear environmental benefits and does not appear to be a design choice the applicant has made for reasons independent of air permitting. Under these circumstances, the Air District would be hesitant to conclude that it could require the applicant to redesign this

¹⁷⁶ The Air District also received a letter outside of the comment period stating that the District should require dry cooling as LAER (“Lowest Achievable Emissions Rate”) for PM_{2.5} because the Bay Area is non-attainment for PM_{2.5}. This letter is not a comment on the record that the Air District is required to respond to, but for the commenter’s information the District points out that LAER is not a PSD requirement, and this facility is not subject to LAER for PM_{2.5} in any event.

¹⁷⁷ See City of Hayward Agenda Report to Mayor and City Council from City Manager (Feb. 6, 2001) (“This site has been selected both because of the industrial character of the area, and its proximity to the [wastewater] treatment plant, as Calpine proposes to utilize recycled water as part of its operation”), available at: www.hayward-ca.gov/citygov/meetings/cca/rp/2001/rp020601-10.pdf; see also RCEC Application for Certification, *supra* note 18, at pp. 9-2 – 9-22 (noting that a key siting criteria for the facility was a “[l]ocation near a sufficient source of cooling water, preferably treated wastewater”).

¹⁷⁸ Calpine originally proposed to construct an Advanced Wastewater Treatment Plant (*see* RCEC Application for Certification, *supra* note 18, at pp. 2-1, 2-13); it subsequently redesigned the facility to be a Title 22 Recycled Water Facility (*see* Russell City Energy Center, LLC, *Amendment No. 1* (Nov. 2006) at 1-1, available at: www.energy.ca.gov/sitingcases/russellcity_amendment/documents/owner/2006-11-17_RCEC_AMENDMENT.PDF).

¹⁷⁹ See City of Hayward Agenda Report to Mayor and City Council from City Manager (Oct. 11, 2005), available at: www.hayward-ca.gov/citygov/meetings/cca/rp/2005/rp101105-06.pdf.

¹⁸⁰ See 2002 Energy Commission Decision, *supra* note 17, at p. 17.

source to use dry cooling in this case, as it would disrupt one of the basic objectives of the proposed facility which is recycling the wastewater from the City's treatment plant.

Ultimately, however, Air District need not resolve this issue here because – regardless of whether the Air District could require the applicant here to change from a wet cooling system to a dry cooling system – the Air District would decline to require dry cooling as BACT in this particular case because of the ancillary environmental benefits from using a wet cooling system here. If the Air District were to undertake a BACT analysis and compare wet cooling and dry cooling as alternative feasible control technologies, it would select wet cooling for this facility in “Step 4” of the top-down BACT analysis because of the benefits associated with recycling the City of Hayward's wastewater, which would otherwise be discharged into the Bay. The facility's “Zero Liquid Discharge” plant will minimize potential harm to water quality in the vicinity of the Water Pollution Control Facility's outfall, where wastewater that has undergone secondary treatment would otherwise be discharged into the bay. Although the City's wastewater is treated before discharge, it still contains minor amounts of water pollutants that contribute to the overall pollution levels in the Bay. Elimination of such water pollution, even in relatively small amounts, contributes to the health of the Bay and is therefore a beneficial environmental effect. This conclusion is supported by the State Water Resources Control Board, which encourages power plants wherever possible to draw cooling water from wastewater that is already being discharged into surface water bodies.¹⁸¹ The Air District has concluded that this net environmental benefit would support the choice of wet cooling over dry cooling for this particular facility, to the extent that the BACT analysis can even consider a redesign of the facility to change the cooling system.¹⁸²

¹⁸¹ State Water Resources Control Board, “Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling”, Resolution 75-58, adopted June 19, 1976), at 4-5. The project's use of secondary effluent from the Hayward's treatment plant is in accord with the goal of this Policy, which is “to protect beneficial uses of the State's water resources and to keep the consumptive use of freshwater for power plant cooling to that minimally essential for the welfare of the citizens of the State.” (*Id.* at 1.) The Policy is clear in its preference for locating power plants near coasts to minimize impact on the quality of freshwater resources, fish and wildlife. (*Id.* at 3.)

¹⁸² The Air District received some comments during the second comment period that were skeptical that using recycled cooling water from the City's wastewater treatment plant would actually provide environmental benefits. The comments stated that there may be adverse environmental effects by ceasing to discharge the water into the Bay; and that there may be adverse effects because of the energy needed to run the tertiary treatment plant needed to clean the water sufficient for use as cooling water, and because of the potential for pollution from the generation of that energy. The Air District disagrees that there would be a net environmental harm from using recycled water. The elimination of the wastewater discharge into the Bay will not have any detectible impact on overall water levels in the Bay. The amount of wastewater at issue is on the order of 4 million gallons per day, which will not even amount to a ‘drop in the bucket’ compared to the total volume of water in the San Francisco Bay. Regarding treatment of the water, even if the facility were to use water from some other source, it would still have to be treated to remove any impurities. There are no natural sources of water near the project location that are sufficiently clean to be able to be used without further purification.

In addition, beyond these important water quality issues, there are other ancillary environmental and energy impacts associated with dry cooling that further support the Air District's conclusion on this issue.¹⁸³ An air-cooled condenser would constitute a significant heat sink in the proposed facility's Rankine cycle, requiring 48 fans that would consume 7,250 kilowatts of electrical power. In contrast, the wet cooling tower requires nine fans, requiring only 1,314 kilowatts. While the use of an air cooled condenser would reduce the load required by the tertiary water treatment and Zero Liquid Discharge by approximately 2,850 kilowatts, the net result would still be a reduction in plant output of approximately 3,086 kilowatts, or slightly more than 3 MW, which would represent a net reduction in overall plant efficiency of about 0.3%. This additional 3,086 kilowatts of parasitic load would require approximately 21 MMBtu/hr to produce the same electric load to the grid, which would represent nearly an additional 2,500 pounds per hour of CO₂ (with a proportionate impact on criteria pollutants as well). An air-cooled condenser would also be taller and bulkier – 144 feet tall at its apex (compared to just under 58 feet for the cooling tower) and with a footprint of 88,440 square feet (compared to 61,133 square feet for the cooling tower) – and thus have a greater visual impact as well as a greater “downwash” impact. An air cooled condenser would have greater noise impacts due to its greater height and surface area, which would result in greater acoustic radiation of noise from the proposed facility to the nearby shoreline. These additional ancillary impacts would further support the choice of wet cooling over dry cooling for this particular facility.¹⁸⁴

Comment VI.5. – Alameda County Public Health Department Letter in CEC Eastshore Proceeding:

The Air District received comments referring to a letter submitted by the Alameda County Public Health Department submission in the CEC proceeding for the proposed Eastshore Energy Center requesting the CEC to postpone approval of new power plants pending further study and understanding of the health impacts of fine particulate matter.

Response: The Air District acknowledges the County's submission in the Eastshore Energy Commission proceeding. In the Commission's Russell City proceeding, the Commission considered all of the evidence before it, including evidence based on particulate matter impacts, and concluded that it was appropriate to approve the Russell City project under the circumstances. It is not the Air District's role to second-guess the Energy Commission's determination on this issue. As far as the Federal PSD Permit is concerned, the Air District has evaluated particulate matter impacts as explained in the Statement of Basis, in the Additional

¹⁸³ See “Evaluation of Dry Cooling for the Russell City Energy Center”, Alex Prusi, P.E., Calpine Director of Engineering, October 22, 2009.

¹⁸⁴ The Air District also received comments regarding the potential for the wet cooling system to cause outbreaks of Legionnaire's disease. These comments were not specifically directed to the issue of whether dry cooling should be required instead of wet cooling, but the Air District considered this issue as a potential ancillary impact associated with wet cooling. As explained below in Section XIV regarding health risks, however, the Air District found that there would not be any significant risk of Legionnaire's disease from the wet cooling system. (See Response to Comment XIV.5. below.) The Air District therefore concluded that this concern would not rule out wet cooling as a BACT control technology.

Statement of Basis, and in these Responses to Comments. Nothing in the County's submission suggests that the Air District's Federal PSD analysis is incorrect with respect to these issues.

Late Communication Regarding Particulate Matter Test Methods:

The Air District also received a communication after the close of the second comment period stating that the permit does not specify the test methods that will be used for annual stack testing in the permit itself. The letter claimed that identification of the test method was critical for PM₁₀ and PM_{2.5} because the magnitude of emissions is determined by the method used to measure them.

Discussion: Since this communication was not received during the comment period, it does not constitute a formal public comment and the Air District is therefore not obligated to consider or respond to it. The Air District would nevertheless like to take this opportunity to reassure the public that the facility will use the latest and most accurate testing methods for all source testing. The testing conditions require that the facility submit its test protocol to the Air District in advance for District review and approval, in order to ensure that the testing will be conducted in accordance with the requirements of the Air District's Manual of Procedures.¹⁸⁵ The testing requirements for particulate matter explicitly contemplate that it may become appropriate to use alternative measuring techniques to measure condensable PM such as use of a dilution tunnel or other appropriate method used to capture semi-volatile organic compounds, but these alternative techniques can be used only upon obtaining approval from the Air District. The Air District has written the condition this way to allow the facility to propose use of a new test method currently under development by EPA and the American Society of Testing and Materials, should the new method become available during the facility's operating life. If the data obtained from use of this method should demonstrate that much lower levels of PM are actually emitted than reported by the current standard test method, such data would support imposition of lower BACT limits on future proposed sources. The Air District also notes that the Environmental Appeals Board has approved of source testing requirements imposed in this manner, with a requirement that the facility submit a source test protocol for review and approval by the permitting agency.¹⁸⁶

¹⁸⁵ See Bay Area Air Quality Management District, Manual of Procedures. The Air District's Manual of Procedures sets forth specific testing protocols for source testing for a number of pollutants, including particulate matter.

¹⁸⁶ See *In re Steel Dynamics, Inc.*, 9 E.A.D. 165, 236 (EAB 2000) (rejecting claim that source test requirements were impermissibly vague for not specifying the specific conditions under which the testing must be conducted, where source test protocol would be subject to review and approval by the permitting agency).

VII. SO₂ ISSUES

Comment VII.1 – Carlsbad SO₂ Emissions Limits:

The Air District also received comments stating that the proposed Carlsbad Energy Center will emit only 5.6 tons per year of SO₂, compared with 12.2 tons for Russell City.

Response: The facility's SO₂ emissions are below the Federal PSD significance threshold and thus the PSD requirements do not apply to SO₂.¹⁸⁷ SO₂ emissions are therefore not relevant to the PSD permitting analysis. Nevertheless, the Air District reviewed the Carlsbad SO_x limits in response to these comments. These comments incorrectly cited the amount of SO_x that the Carlsbad facility will emit. The Final Determination of Compliance indicates that it will emit up to 16.9 tpy of SO₂, which is substantially more than the 12.2 tpy that the Russell City facility is expected to emit.¹⁸⁸ The Air District also notes that the Carlsbad facility will be permitted to operate only 4100 hours per year, whereas the Russell City facility will be permitted to operate throughout the entire year, as discussed in Response to Comment IV.C.3. above.

¹⁸⁷ See 40 C.F.R. 52.21(b)(23)(i) (40 tpy significance threshold). In addition, note that SO₂ is now also PSD-regulated as a secondary particulate matter precursor, but the significance threshold is the same as for SO₂ as a pollutant in its own right. See 73 Fed. Reg. 28321, 28327, 28349 (May 16, 2009).

¹⁸⁸ Compare Carlsbad Energy Center FDOC, *supra* note 134, at p. 13 Table 31, with December 8, 2008, Russell City Statement of Basis, at p. 14.

VIII. STARTUP AND SHUTDOWN ISSUES

The Air District received a number of comments on the proposed BACT startup and shutdown emission limits and District's technical analysis supporting them. In response to these comments, the Air District has reviewed the proposed startup limits and is lowering several of them as summarized in Table 3 below. The Air District published a revised Draft PSD permit in August of 2009 proposing these revised limits and received further public comment during the second comment period. The Air District is now finalizing the revised startup and shutdown limits as proposed and the August 2009 revised draft. The Air District's responses to all of the comments on these issues, in both comment periods, are set forth below.

A. Applicability Of BACT Requirement To Startups And Shutdowns

The Air District received some comments about the applicability of BACT generally for startups and shutdowns, and about whether the Air District's approach to BACT for these operating modes was appropriate.

Comment VIII.A.1. – Applicability of BACT to Startups and Shutdowns:

The Air District received comments disagreeing with its position that the stringent BACT limits proposed for normal operations would not be achievable during startups and shutdowns. The comments claimed that the permit needs to include BACT limits for all operating modes, and cannot exclude startups and shutdowns from the BACT requirement. In this context, the commenter cited the Environmental Appeals Board's decisions in the *Indeck-Niles Energy Center* case (in which the EAB observed that the petitioner had failed to raise the issue of whether the permit should have imposed short-term BACT emission limits for startup and shutdown emissions) and the *Tallmadge Generating Station* case (in which the EAB held that that PSD permits need to include BACT limits for startup and shutdown events).

Response: The Air District agrees that BACT is applicable to and required for startup and shutdown operations. The Air District's analysis and permit limits are consistent with the cited EAB precedents and other authorities regarding BACT. These comments appear to have misunderstood the District's point that the specific BACT limits imposed for normal operations are not achievable during startups and shutdowns. That point does not mean that BACT does not apply during startups and shutdowns, it simply means that different limits specific to those operating periods (and achievable during those periods) must be imposed.¹⁸⁹ The Air District published this further clarification of its position in the Additional Statement of Basis and invited members of the public to comment on it further if there any members of the public who continue to believe that the Air District is not including permit limits applicable to startup and shutdown operation. The Air District did not receive any such comments during the second comment period.

¹⁸⁹ See *In re Indeck-Niles Energy Center*, PSD Appeal No. 04-01, slip op. at 14-15 (EAB Sept. 30, 2004).

Comment VIII.A.2. – Inclusion of Startup Limits as Enforceable Permit Conditions:

The Air District also received comments that understood that the Air District had conducted a BACT review for startups and shutdowns, but contended that the BACT limits on startup and shutdown duration are not included in the permit conditions.

Response: In response to these comments, the Air District refers the commenters to the definitions of startup and shutdown. Startup and shutdown periods are defined with a maximum duration, and after the end of the startup and shutdown period the turbines have to comply with the more stringent emissions limits applicable during normal, steady-state operation. If the startup is not complete by the time the maximum startup duration has elapsed (*i.e.*, if the facility has not achieved normal, steady-state operation), the facility will have violated its permit conditions and will be subject to enforcement action. The Air District published this further explanation of how the startup and shutdown limits work in the permit conditions in the Additional Statement of Basis, and received no further comments on the issue during the second comment period.

B. BACT Limits For Startups

The Air District also received a number of comments during the initial comment period regarding the specific permit limits it proposed for startups and shutdowns. The District agreed with many of these comments, and in response it proposed reduced limits for several startup scenarios in the August, 2009, revised Draft PSD Permit and Additional Statement of Basis. In response to this revised proposal, the Air District received further comments during the second comment period. The Air District's responses to all of the comments received on issues concerning the startup permit limits, during both comment periods, are set forth in this section.

Comment VIII.B.1. – Stringency of Startup Emissions Limits:

Several of the comments received during the first comment period claimed that the Air District should impose more stringent emissions limits for startups. In support, these comments cited several facilities that they claimed establish that lower startup limits would be achievable for this facility. In particular, the commenters pointed to the Palomar Energy Center in Escondido, CA; the Lake Side Power Plant in Vineyard, UT; and the Caithness Long Island Energy Center in Brookhaven, NY, as facilities that they claim demonstrate that startup lower limits would be achievable as BACT here. The Air District had evaluated data from the first of these, Palomar, in the December, 2008, Statement of Basis (*see* Statement of Basis at pp. 41-42), but the comments claimed that additional data from the facility was available. Some comments stated that the Air District should require the specific technologies used at these facilities as BACT. Others stated that the Air District should establish a BACT emissions limit reflecting the same level of startup emissions reductions as achieved at these facilities, if it does not impose a requirement specifying the particular type of equipment to use.

Response: The Air District agrees with these comments that based on all of the available information, including the examples from these three facilities, the facility should be able to achieve lower BACT startup emissions limits than the Air District initially proposed in several areas. For NO₂ emissions, the Air District has concluded that the BACT limit for hot startups should be lowered from 125 lbs. to 95 lbs. based on further review of the emissions performance

achieved by other facilities, including the Palomar Energy Center. For warm and cold startups, the Air District continues to believe that the NO₂ emissions limits it initially proposed are appropriate because the additional information it has reviewed supports these limits as the lowest that can reasonably be achieved over time. For CO emissions, the Air District has concluded that the emissions limits should be reduced from 5028 lbs. to 2514 lbs. for cold startups and from 2514 pounds to 891 pounds for hot startups. For warm startups, the Air District continues to believe that the CO limit of 2514 pounds initially proposed is the appropriate BACT limit. Table 3 below provides a summary comparison of the startup emissions limits the District initially proposed and the revised limits the District is now imposing in the final permit.

Table 3: Summary of Startup Emissions Limits – Initial Proposal and Final Permit Limits

	NO ₂ Emissions Limits (lbs/startup)		CO Emissions Limits (lbs/startup)	
	Initial Proposal	Final Permit Limit	Initial Proposal	Final Permit Limit
Hot Startups	125	95	2514	891
Warm Startups	125	125	2514	2514
Cold Startups	480	480	5028	2514

The Air District’s further evaluation of the appropriate BACT startup limits, including its assessment of the three comparable facilities cited in the comments, is set forth in detail in the following paragraphs.

- ***Palomar Energy Center, Escondido, CA***

With respect to the Palomar facility, the Air District obtained additional emissions data that has been reported to the San Diego Air Pollution Control District (SDAPCD). This data included all NO_x emissions data for the facility from October of 2006 through the end of 2007, and covers approximately 36 startup events involving the two turbines at the facility.¹⁹⁰ Although this is a fairly substantial amount of data, it is still somewhat of a preliminary picture of what the facility will be able to achieve over the long term given that it represents only a little over a year’s worth of operation. Nevertheless, the Air District believes that it can use the data for what it is – an early indication of what startup NO₂ emissions this facility is likely to be able to achieve over time.¹⁹¹

¹⁹⁰ The Air District sought additional data since the end of 2007, but the facility has not reported any to the SDAPCD. The Air District also contacted the Palomar facility directly and requested review of additional data, but the facility declined and the Air District had no way to compel release of the data. (Telephone conversation between Alexander G. Crockett, Esq., BAAQMD, and Taylor O. Miller, Esq., Sempra Energy, 4/15/09.) In addition, the applicable permit limits for Palomar are of little help in evaluating the appropriate BACT permit conditions here, as they are much higher than those proposed for Russell City and the Air District does not consider them to represent BACT limits.

¹⁹¹ Note that the startup limits in the permit for the Palomar facility are far higher than anything the Air District has considered for Russell City: 400 lbs/hr NO_x and 2,000 lbs/hr CO (and note that these limits are *hourly* limits, meaning that total emissions for an entire startup can be

The Air District has therefore analyzed all of this data, in conjunction with the startup data from other facilities it reviewed in its original analysis for the proposed permit, to refine its BACT analysis for startups in response to the comments received. The Air District's analysis was based on taking the raw, minute-by-minute CEM data from the facility and estimating when startups began and ended based on changes in O₂ concentrations. The Air District notes that the emission rates it arrived at through these calculations are somewhat lower than the emissions rates calculated by the SDAPCD for the four startups where SDAPCD calculations are available.¹⁹² The Air District therefore concludes that its method is a conservative assessment of the actual emissions performance achieved during these events. The Air District also notes that it considered data only from after October 13, 2006, for turbine 1 and after October 12, 2006, for turbine 2, the dates on which the facility began to implement the full complement of efforts it has made to reduce startup emissions under a variance from the SDAPCD Hearing Board. The Air District excluded data from these dates and before because the comments that urged the Air District to consider the Palomar data asserted that it is the period after implementation of these efforts that evidences the best achievable startup emissions performance. Since the excluded data consist of, for the most part, data showing high emissions (for example, a cold startup event at turbine 1 on October 11, 2006, that produced 735 pounds of NO₂ emissions), the District's approach is, again, conservative.

Once the Air District collected and refined the data from Palomar, it broke the data out into cold, warm, and hot startups in order to compare it with the proposed Russell City limits.¹⁹³ (The Air District's summary of the Palomar data points is set forth in Appendix A to the Additional Statement of Basis.) Looking first at cold startups, the available data suggests that the Palomar facility is achieving cold startup emissions at levels very similar to the facilities on which the Air District based its initial proposed Russell City startup limits. The average NO₂ emissions for cold startups (defined as the turbine having been down for over 48 hours) were 182.8 pounds, which is very similar to the cold startup averages that the Air District reviewed for the Delta Energy Center and Metcalf Energy Center in the Statement of Basis, which were 193 pounds and 185 pounds, respectively (*see* Statement of Basis at page 46, tables 15 and 16). The highest NO₂ emissions during a cold startup at Palomar, on October 22, 2007, were 375 pounds according to the District's calculations or 437 pounds according to the SDAPCD's calculations, which again

several times these hourly rates). (*See* Startup Authorization, SDG&E, 2300 Harveson Place, Escondido, CA 92029, San Diego County Air Pollution Control District, App. No. 984461, PO No. 976846, April 30, 2008, at Conditions No. 16-17.)

¹⁹² The four startup events where SDAPCD calculations are available are the following:

Date	Turbine	SDAPCD Calculation	BAAQMD Calculation
12/10/06	1	26 pounds	22 pounds
10/22/07	1	285 pounds	225 pounds
12/23/06	2	115 pounds	111 pounds
10/22/07	2	437 pounds	375 pounds

In the following analysis, where data points are available from both the SDAPCD and BAAQMD calculations, both are given for the sake of completeness.

¹⁹³ Cold startups are startups when the turbine has been off-line for more than 48 hours; warm startups are when the turbine has been off-line for between 8 and 48 hours; and hot startups are when the turbine has been offline for less than 8 hours.

is similar to Delta and Metcalf, for which the highest cold startups were at 281 and 335 pounds, respectively (*see* Statement of Basis at page 46, tables 15 and 16). Based on this review, it appears that Palomar is performing at or near the level of the other similar facilities that the Air District considered in the Statement of Basis, but certainly not any better than that. The Air District concludes from this comparison that the Palomar data serve to confirm its earlier assessment of the appropriate cold startup limits for Russell City, and certainly do not suggest that the initial analysis was inaccurate.

The Air District did observe that the Palomar data showed a maximum startup emissions event of 375 or 437 pounds (depending on which calculation is used), which is somewhat below the proposed Russell City cold startup limit of 480 pounds. But the Air District does not consider this level of compliance margin – which is 9%-22% of the permit limit, depending on whose calculation is used – to be unreasonable for several reasons. First, the data from Palomar includes only five available data points for cold starts, which does not generate a great deal of statistical confidence that the maximum seen in this data set is representative of the maximum that can be expected over the entire life of the facility. Moreover, the wide variability in the data that is available highlights the variability in individual startups, underscoring the need to provide a sufficient compliance margin to allow the facility to be able to comply during all reasonably foreseeable startup scenarios. For both of these reasons, the Air District has concluded that a cold startup limit of 480 pounds of NO₂ is a reasonable BACT limit that is consistent with the startup emissions performance seen at the Palomar facility.

The Air District next reviewed the warm startup NO₂ emissions data from Palomar. The available Palomar data show NO₂ emissions from warm startups ranging as high as 111 pounds, or 115 pounds according to SDAPCD's calculations (on December 23, 2006). This is just 14 pounds (or 10 pounds according to SDAPCD) below the proposed warm start limit of 125 pounds, or 11% (or 8%) of the proposed limit. The Air District concludes from this evidence that the proposed limit is at least as stringent as could consistently be expected at Palomar. It is statistically unlikely that the highest-emission startup event over the lifetime of the facility would occur during the first 14 months of available data, and it is therefore reasonable to anticipate that emissions could be even more than 111 pounds (or 114 pounds) during certain warm startups. A compliance margin of an additional 11% (or 8%) over the maximum observed over the first 14 months of data at Palomar is not unreasonable, and is appropriate to accommodate the variability in emissions among startup events over time. The Air District therefore finds no basis in the Palomar warm startup data to impose a more stringent NO₂ limit than the 125 pounds-per-startup limit it initially proposed.

Third, the Air District reviewed the hot startup NO₂ emissions data from Palomar. The data the Air District reviewed showed a startup designated as “regular” startup with NO_x emissions of 145 pounds (May 1, 2007). “Regular” startups presumably indicate hot starts, as that is the most normal and frequent type of startup at the facility,¹⁹⁴ but the Air District finds it questionable as to whether this was actually a hot startup (*i.e.*, occurred when the turbine was down for less than 8 hours). Taking the data without this apparent outlier, the Palomar startup data show average

¹⁹⁴ The Palomar facility most commonly operates during the day and shuts down overnight, so its most common startups are after less than 8 hours of down-time.

NOx emissions of 30.3 pounds and a maximum startup event of 75 pounds (November 27, 2006). Looking at the average startup emissions, it appears that Palomar is actually experiencing *higher* average hot startup emissions than the Delta Energy Center on which the Air District based its initial startup limit evaluation. The average hot startup NO₂ emissions for the years 2005 through 2008 at Delta were 25, 26.6, 27.6, and 29.8 pounds respectively, which are all better than the 30.3 pound average at Palomar (and much better than the average of 38.5 pounds if the May 1, 2007 outlier startup is included). Looking at the highest reported startup events, the data from Palomar show a high similar to the highest high at Delta, although a little lower. The highest hot startup seen at Delta was 82.2 lbs, which is slightly higher than the 75 pound startup event at Palomar on November 27, 2006 (although still much better than the 145-pound outlier event of May 1, 2007). The Air District has therefore concluded that for hot startups, the Palomar facility is not achieving an overall startup emissions performance any better than the other comparable facilities the Air District evaluated in establishing the proposed BACT limits. In further considering all of this data, however, the Air District has concluded that a somewhat more stringent compliance margin would probably be achievable here for hot startups. At the 125-pound hot-start limit initially proposed, the compliance margin would be 43 pounds more than the highest data point found at Delta and 50 pounds more than the highest data point from Palomar. The Air District is therefore lowering the NO₂ limit for hot starts in the final permit to 95 pounds per startup. This lower limit will bring the permit limit more in line with the high-emissions startups that have been seen at other similar facilities, while still providing an appropriate margin of compliance to take into account the fact that startups are by their nature highly variable and the highest startup emissions seen in the data collected to date may not necessarily reflect the highest emissions that would reasonably be expected under all circumstances over the life of the facility.

In summary, the Air District agrees with the comments that the additional NO₂ startup data from Palomar shed more light on what level of startup emissions should be achievable at Russell City. The Air District reviewed the additional data and found that Palomar has so far been achieving emissions rates very similar to the facilities on which the Air District based its proposed limits. Based on its review of this data, the Air District has concluded that Palomar confirms the Air District's initial assessment in the Statement of Basis with respect to cold and warm startups, but provides evidence with respect to hot startups that the emissions limit can be reduced from the proposed 125 pounds to 95 pounds per startup. With this revised hot startup limit, the Russell City permit limits align very closely with the startup emissions seen at Palomar based on the available data, as summarized in Table 4 below:

Table 4: Comparison of Palomar Startup NOx Emissions Data to Russell City NOx Startup Limits

	Palomar 14-Month Maximum*	Russell City Permit Limit
Hot Startup	75 pounds	95 pounds
Warm Startup	111/115 pounds**	125 pounds
Cold Startup	375/437 pounds**	480 pounds

*excluding startups that occurred before implementation of startup emissions reduction measures.

**BAAQMD/SDAPCD calculations, respectively

- ***Lake Side Power Plant & Caithness Long Island Energy Center***

The Air District also reviewed the Lake Side Power Plant and Caithness Long Island Energy Center, the other two facilities that the commenters cited. The commenters discussed these two facilities primarily in the context of using an emerging startup technology – the “Fast-Start” once-through steam boiler design – in order to reduce startup emissions. As explained in greater detail in the startup technology section below, the Air District investigated these facilities further and found that they do not use Fast-Start technology, although they do utilize an auxiliary boiler that can have a startup emissions benefit. Nevertheless, they are similar combined-cycle facilities and the Air District evaluated whether they are achieving better startup performance.

The only way to compare the Lake Side and Caithness facilities is based on their startup permit limits, as there is no published data from either facility because they are only just coming online. The Caithness facility has not yet been built, while the Lake Side facility has been operating only since December of 2008, as some comments pointed out, and the Air District is not aware of any actual operating data that is available for it (nor have any of the comments pointed to any). Without actual operating data available for review, the Air District compared the permit limits for those facilities to see whether they suggest that lower permit limits might be appropriate for Russell City.

First, for Lake Side, the facility’s permit has *no* limits whatsoever on emissions during startups.¹⁹⁵ The Air District does not believe that it would be appropriate to issue a permit for the Russell City Energy Center without limits on startup emissions, as discussed above. But to the extent that commenters contend that the Air District should look to Lake Side as a comparable facility, there are no startup limits to compare.

For Caithness, the permit does have emission limits for startups, and it is therefore possible to compare those limits with the Russell City permit limits.¹⁹⁶ The Caithness permit establishes two tiers of startup limits, one for when the auxiliary boiler is being used and one for when the auxiliary boiler is not being used. The Air District evaluated the limits for startups without the auxiliary boiler, which is the scenario corresponding to the design of the Russell City facility.

¹⁹⁵ Utah DEQ Approval Order DAQE-AN3031001-05 (Lake Side Power Plant), Conditions 9 & 12 (available at www.airquality.utah.gov/Permits/DOCS/AN3031001-05.pdf.) The permit does contain daily emissions limits, towards which startup emissions are counted, but has no limits specifically for emissions during startups. In addition, the permit application provided startup information based on vendor data, which were referenced in the Utah DEQ analysis for the permit, but these numbers were for one specific operating temperature and were not presented as vendor guarantees of what the equipment could reliably achieve under all foreseeable operating circumstances. Moreover, the numbers do not identify whether they were for startups using the auxiliary boiler or not. (See Notice of Intent and Prevention of Significant Deterioration Air Quality Application, Lake Side Power Plant (May 2004), Table 3-6.)

¹⁹⁶ *Prevention of Significant Deterioration of Air Quality (PSD), Caithness Long Island Energy Center*, April 7, 2006 (with transmittal letter from W. Mugdan, Director, U.S. EPA Region 2, Division of Environmental Planning and Protection, to R. Ain); available at: www.caithnesslongisland.com/Final%20PSD%20Permt_4.7.06.pdf.

For NO₂ emissions, the Caithness startup limits are all higher than the limits the Air District initially proposed for the Russell City permit here. The Air District therefore concludes that Caithness further supports the reasonableness of these NO₂ startup limits as the lowest achievable BACT limits. At the very least, the Caithness permit cannot be read to suggest that lower NO₂ startup limits are warranted. The story is slightly different for CO startup emissions, however, as the Caithness permit limits for hot and cold startups are below the CO startup limits the Air District initially proposed for Russell City. Specifically, the Caithness hot startup limit for CO (without auxiliary boiler) is 891 pounds, which is significantly lower than the 2514 pound CO hot startup limit initially proposed for Russell City. Further, the Caithness cold startup limit for CO (without auxiliary boiler) is 2813 pounds, which is significantly lower than the 5028 pound CO cold startup limit initially proposed for Russell City. Upon further consideration, the Air District believes that revisiting the proposed Russell City limits for hot and cold startups would be appropriate in light of this new information from Caithness. The Air District is therefore lowering the hot startup limit to 891 pounds of CO, based on the limit imposed in the Caithness permit for similar equipment. The Air District is also lowering the cold startup limit to 2514 pounds of CO, based on the Caithness permit and on another lower permit limit the Air District examined in further considering this issue, the Sutter Power Plant. The Sutter facility has a permit limit of 2514 pounds of CO per cold startup and has been achieving this limit, and the Air District concludes that a 2514 pound limit would be achievable at Russell City as well.¹⁹⁷

Based on this review, the Air District has concluded that the Russell City startup limits will be as stringent as (or more stringent than) either Lake Side or Caithness for startups without an auxiliary boiler. For ease of comparison, the Lake Side, Caithness and Russell City permit limits are summarized in Table 5 below.

Table 5
Comparison of Lake Side, Caithness and Russell City
Startup Emissions Limits (without Auxiliary Boiler)

Startup Scenario	Lake Side Permit Limit	Caithness Permit Limit	Russell City Permit Limit
Hot Startup	n/a	127 lbs. NOx	95 lbs. NO ₂
	n/a	891 lbs. CO	891 lbs. CO
Warm Startup	n/a	488 lbs. NOx	125 lbs. NO ₂
	n/a	2813 lbs. CO	2514 lbs. CO
Cold Startup	n/a	488 lbs. NOx	480 lbs. NO ₂
	n/a	2813 lbs. CO	2514 lbs. CO

¹⁹⁷ See California Energy Commission, *In the Matter of Calpine Construction Finance Company, L.P.'s Sutter Power Project, Order Approving Amendment to Change Startup Emission Limits and Other Air Quality Conditions*, Docket No. 97-AFC-2C, Order No. 03-0611-01(k), June 11, 2003, p. 9, available at: www.energy.ca.gov/sitingcases/sutterpower/compliance/2003-07-24_APRVNG_AMNDMNT.PDF.

The Air District also considered the possibility of requiring an auxiliary boiler, which would presumably be able to achieve lower emissions limits similar to those expressed in the Caithness permit applicable when the auxiliary boiler is used. Upon further consideration of this issue, the Air District has concluded that while auxiliary boilers are common technology in colder climates to keep equipment warm in cold weather, the costs associated with requiring such equipment at Russell City would not be justified by the relatively small startup emissions reductions that would be gained. (See discussion in Response to Comment VIII.C.4. below for the complete analysis.) The Caithness permit limits for this operating scenario are therefore not comparable to Russell City and the Air District does not consider them as indicative of what the Russell City facility will be able to achieve.

In summary, the Air District agreed with the comments it received that it should examine the Palomar, Lake Side, and Caithness facilities as comparable facilities to determine if the startup limits in the Russell City permit are the lowest achievable. As outlined in the foregoing discussion, the conditions that the Air District is imposing in the final permit are the most stringent achievable based on a review of these facilities as well as all other available data.

The Air District published this further analysis and the lowered startup limits in the August 2009 Draft Permit and Additional Statement of Basis and invited further public review and comment. During the second comment period, the Air District received comments criticizing the proposed NO₂ limits for cold and hot startups. For cold startups, the comments criticized the proposed limit of 480 lbs/startup and stated that the other similar facilities that the District evaluated show average startup emissions in the range of 183 to 193 pounds. These comments stated that the proposed limit of 480 pounds is in fact the second-highest emissions data point from the Sutter facility. Similarly, for the hot startup NO₂ limit of 95 pounds, the comments stated that the Air District should base the permit limit on the average emissions performance of other similar facilities, which they claimed was 25 to 29.8 pounds, and that it was improper to look to the maximum emissions associated with startups instead of the average. These comments further stated that the Air District has not adequately explained the basis for the compliance margin provided in these limits.

In response to these comments, the Air District disagrees that the BACT limits should be based on the average startup emissions performance observed at other similar facilities. The BACT limits will be enforceable, not-to-exceed permit limits that the facility will be required to comply with at all times and under all foreseeable operating conditions, not just during average startups. The limits therefore need to allow for a sufficient compliance margin to accommodate all reasonably foreseeable startups, not just the average case. The Air District took this requirement into account in deriving the startup limits, as explained in the Statement of Basis, Additional Statement of Basis, and the further analysis described above. As explained above, the 480-pound cold-startup limit was based on early data from the Palomar facility showing emissions could be as much as 375-437 pounds for a cold startup, with a reasonable additional compliance margin to allow for the fact that startups are highly variable in nature and that the 375-437 pound startup emissions seen in the Palomar data may not necessarily be the highest startups the facility will experience over its lifetime. Similarly, the 95-pound hot-startup limit was based on the Palomar data showing hot startup emissions of up to 75 pounds (excluding the 145-pound data point as an apparent outlier) with a reasonable compliance margin. The Air District believes that

this is a reasonable and appropriate approach to implementing not-to-exceed BACT limits that are the lowest achievable under all operating situations. The Air District disagrees with the comments that this approach is unreasonable for the reasons stated above. The Air District also disagrees with the comments that it has not adequately explained how it came up with these limits, as the District's analysis was clearly set forth in the Statement of Basis (pp. 38-47) and Additional Statement of Basis (pp. 58-74), and has been further clarified in this document.

Comment VIII.B.2. – Limits On Startup Duration:

The Air District also received some comments suggesting that the length of time it proposed to allow for startups is longer than it needs to be. The comments criticized the Air District's reliance on the startup limits for the Delta, Los Medanos, and Metcalf Energy Centers and the Sutter Power Plant in its analysis of the appropriate startups limits for Russell City, claiming that these facilities may not represent the best startup times achievable today using best work practices. The comments argued that the Air District must evaluate whether shorter startup timeframe would be achievable using best work practices, and cited one recent permit – for the Colusa Generating Station in Colusa, CA – that had been issued with shorter startup time limits of 4.5 hours for cold startups (compared with 6 hours proposed for Russell City) and 1.5 hours for hot startups (compared with 3 hours proposed for Russell City).¹⁹⁸

Response: The Air District disagrees with these comments that BACT requires shorter startup limits, because (i) BACT requires permit conditions to limit *emissions*, and does not require a limit on startup durations as long as the *emissions* involved are limited to the greatest extent achievable; and (ii) even if BACT does require a limit on startup time periods, there is no indication in these comments that a shorter duration than the Air District proposed would be achievable.

1. Applicability to BACT to Startup Duration (as Opposed to Startup Emissions)

At the outset, the Air District notes that startup duration, as opposed to startup emissions, is not technically subject to the BACT requirement. BACT is “an *emission limitation . . . based on the maximum degree of reduction for each pollutant*” achievable by the facility (40 C.F.R. § 52.21(b)(12) (emphasis added)). It is thus a limitation on the amount of pollution emitted, not on the duration of any particular operating mode. As long as a facility can achieve the lowest *emissions* from startups among sources of its type, the facility will satisfy BACT even if it has to take a longer *time* to get to steady-state operating conditions. The reason for this rule is obvious: it is the emissions that matter from an air quality standpoint, not the time involved, and so if two facilities can achieve the same emissions performance there is no air quality reason to prefer one startup duration over the other (and indeed if one can achieve lower total emissions but needs a longer time frame to do so, the longer lower-emissions startup should be encouraged). The Air District has traditionally included startup duration among its permit conditions because as a

¹⁹⁸ Note also that some of the comments on this subject cited emerging technologies that they claimed can reduce startup times, which are addressed in the technology choice section below. This Response focuses on the startup time limits that can be achieved using best work practices, without additional technologies that the Air District is not requiring as BACT because of the reasons outlined below.

general rule shorter startups equate to lower startup emissions, but as long as the emissions rates are at the lowest level achievable the facility will satisfy BACT regardless of duration. Here, the Air District's evaluation has concluded that the Russell City Energy Center will be subject to the most stringent achievable startup *emissions* limits as explained in the initial Statement of Basis, the Additional Statement of Basis, and these Responses to Comments, and so the facility satisfies the BACT requirement on that basis. Imposing an additional requirement on startup durations is not technically required by BACT.

The Air District published this further legal analysis in response to these comments in the Additional Statement of Basis, and received further comments on the issue during the second comment period. These further comments questioned the Air District's conclusion that startup durations are not technically subject to BACT requirements, as opposed to startup emissions. The comments did not cite any support in the BACT definition in the PSD regulations or in any EPA guidance. Instead, they challenged the District's argument that BACT requires achieving the lowest *emissions* limit as opposed to the shortest *duration* simply by asserting that shorter startups will involve lower emissions. But this argument actually supports the Air District's conclusion, as it tacitly agrees that what is ultimately important is emissions. The commenters' goal here is thus the same as the Air District's – to achieve the lowest emissions from a startup. If the permit limits achieve that goal, they satisfy BACT even if there is no limit on startup duration.¹⁹⁹ Ultimately, however, this issue is moot because the District *is* imposing enforceable BACT permit limits on startup durations in the permit, as discussed below.

2. *Derivation of Startup Duration Limit*

Beyond this threshold point regarding BACT applicability, the Air District has in response to these comments considered further whether current best practices can achieve shorter startup times than what was achievable by the facilities that it reviewed in the Statement of Basis, which as the comments pointed out were permitted pre-2001. The Air District has concluded from this review that there is no reliable evidence that they can. The commenters did not cite any evidence of advances in best work practices since those facilities were permitted, and their criticism of the Air District's reliance on those facilities is based solely on the passage of time. Moreover, some

¹⁹⁹ The comments also questioned why, if BACT is ultimately focused on startup emissions and not startup duration, EPA Region 9 imposed permit conditions for the Colusa project with shorter startup durations (at least initially) than the Air District is requiring here. The only indication of why EPA Region 9 imposed initial limits startup on startup duration shorter than the Air District is imposing here is found in Region 9's Ambient Air Quality Impact Report. As discussed below in connection with the Colusa permit (*see* note 201 below), Region 9's explanation was that the applicant proposed such limits and they were lower than other permit limits Region 9 was aware of. The Air District does not find this to be conclusive evidence that the Colusa duration limits will be achievable, especially in light of Region 9's position that the limits may not be achievable and will have to be revisited if they are not. Moreover, the Colusa permit includes higher emissions limits than the Air District is requiring here, as explained below in footnote 201, and so the Air District is skeptical of basing its startup BACT analysis on the Colusa permit, especially where there are not yet any operating data from the facility to show exactly what level of performance the facility will be able to achieve.

of the commenters themselves cited contrary evidence, in the form of recent testimony before the California Energy Commission that using current technology, startups at combined-cycle facilities “can take a minimum of three and possibly six hours”²⁰⁰ Based on this record, the Air District finds little compelling evidence that there have been any significant advances in operational practices in recent years that can reduce startup times.

The one recent permit the comments did cite on this issue is the Colusa permit, which the Air District reviewed in detail in response to these comments. Although that facility has not been built yet and so there are no actual operating data on which to assess its startup performance, the commenters are correct that the permit for the facility does include tentative initial time limits for hot and cold startups that are shorter than the Air District is proposing for Russell City, as noted above.²⁰¹ But even if the facility will be able to achieve steady-state operation within these time limits, that does not mean that it will achieve better startup performance. To the contrary, the startup limits for the Russell City Energy Center will be *lower* than for Colusa, notwithstanding Colusa’s shorter time limits. Specifically, the Colusa permit allows up to 779.1 pounds of NO₂ per cold startup and 259.9 pounds of NO₂ per hot startup.²⁰² By contrast, Russell City will be limited to 480 pounds of NO₂ per cold startup and 95 pounds of NO₂ per hot startup, approximately half the amount allowed at Colusa.²⁰³ The Air District therefore concludes based

²⁰⁰ See Comments on Draft PSD Permit on behalf of Citizens Against Pollution, Feb. 5, 2009, p. 11 (citing testimony before the California Energy Commission on December 18, 2008).

²⁰¹ Because the facility has not yet been built, there is no evidence from this facility on which to rely other than the analysis and justification in the permitting agency’s BACT analysis. But that analysis does not include any actual operating data showing that these limits are achievable. To the contrary, it appears that the permitting agency concluded that the startup limits satisfied BACT because the applicant had proposed them and because they were below the limits in other permits for similar facilities. (See EPA Region 9, *Ambient Air Quality Impact Report, Colusa Generating Station*, PSD Permit No. SAC 06-01 (May 2008) (hereinafter, “Colusa Ambient Impact Report”), at pp. 19-20, available at www.regulations.gov/fdmspublic/component/main?main=DocketDetail&d=EPA-R09-OAR-2008-0436.) Moreover, the permitting agency explicitly considered that the startup limits might not turn out to be achievable, explaining that if experience shows that they are unrealistic then they will have to be reevaluated. (See *id.*) The Air District therefore finds it highly questionable whether the Colusa example provides any hard evidence on which to conclude that the short startup limits in the permit are achievable. The issue is moot, however, as regardless of startup times the Russell City permit limits require lower emissions than the Colusa permit limits.

²⁰² See US EPA Region 9, Colusa Generating Station Final PSD Permit (Sept. 29, 2008) (available at www.regulations.gov/fdmspublic/component/main?main=DocketDetail&d=EPA-R09-OAR-2008-0436). The project owner has applied for certain amendments to the PSD Permit, but the proposed amendments would not affect the startup conditions. See Proposed Amended Permit Conditions, Colusa Generating Station, PSD Permit No. SAC 06-01, available at www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a1ee9e (redline version showing proposed changes).

²⁰³ The Air District notes that the Colusa startup limits for Carbon Monoxide are somewhat lower than the Russell City startup CO limits. (See Colusa Permit at www.regulations.gov/fdmspublic/component/main?main=DocketDetail&d=EPA-R09-OAR-

upon its review of the Colusa permit that the Russell City permit limits do satisfy the Federal PSD BACT requirement.

The Air District published this further explanation and analysis in the Additional Statement of Basis and solicited further public comment. The Air District received comments during the second comment period further claiming that it had not justified its proposed limits on startup duration. These comments again pointed to the Colusa permit and claimed that it imposes shorter time limits on startups. The commenters stated that the Air District has not justified why it should not impose limits similar to those in the Colusa permit. In response to these further comments, the District disagrees that the Colusa permit conditions show that shorter startup times would be achievable here for all of the reasons provided previously. The feasibility of the Colusa startup duration limits was not verified by EPA Region 9 by any analysis to determine whether they will be achievable or not; they were simply proposed by the permit applicant and accepted by EPA.²⁰⁴ Moreover, they were accepted as initial limits only, and will be subject to amendment “if source testing determines that these emission rates are not achievable”.²⁰⁵ The Air District therefore does not consider the issuance of this permit as sufficient demonstration that shorter startups can be achieved at Russell City in light of the countervailing information indicating that longer startups may sometimes be necessary.

Comment VIII.B.3. – Average Startup Limits:

The Air District also received comments stated that it should require cold-start NO₂ emissions to meet an overall average limit as well as a maximum limit for a particular startup event.

Response: The Air District considered these comments and has concluded that limits on the maximum emissions allowed during cold startups are sufficient to ensure compliance with the PSD BACT requirement. Startup performance is inherently highly variable, and it is difficult to ascertain with certainty what an achievable average emissions rate would be over a particular averaging period. Moreover, a maximum limit will force the facility to implement best work practices to minimize emissions during all startups, which will have the indirect effect of limiting emissions over a group of startups in a given period. And average startups limits are also

2008-0436.) The fact that Colusa has higher NO_x startup limits than Russell City in conjunction with lower CO startup limits highlights the NO_x/CO tradeoff that the Air District noted in the Statement of Basis. The Air District does not agree with favoring reduced CO in exchange for increased NO_x emissions because the Bay Area is in attainment of the applicable CO NAAQS but is non-attainment with the applicable ozone NAAQS (and NO_x is an ozone precursor). The Air District therefore does not find that the Colusa permit provides evidence on which to justify a lower CO limit for startups. To the extent that the Colusa permit shows that lower CO startup limits are technically feasible, the Air District would reject them in favor of the limits it is imposing here based on the ancillary environmental impacts involved in going to those lower CO limits – that is, the increased NO_x emissions that would be involved, as evidenced by the higher Colusa NO_x limits. Moreover, the District also notes that the Colusa facility has not yet been built, and so there are no operating data available to show whether the facility will actually be able to achieve these limits.

²⁰⁴ See Colusa Air Quality Impact Report, *supra* note 201, at pp. 19-20.

²⁰⁵ See *id.* at p. 20.

indirectly limited by the annual limit on NO₂ emissions, which will encompass the emissions from all of the startups throughout a given year. For all of these reasons, the Air District declines to impose average limits on cold startup NO₂ emissions based on these comments. BACT will be adequately implemented by short-term emissions limits, which is the preferable type of BACT limit for Federal PSD permits.

Issue VIII.B.4. – Restriction on Simultaneous Startups of Both Turbines:

The Air District also realized that the proposed permit conditions did not include a restriction on both turbines being in startup mode at the same time. This is a common restriction designed to minimize short-term emissions. A restriction on simultaneous startups was imposed in the Energy Commission’s license for this facility, but was inadvertently left out of the proposed PSD permit. The Air District did not receive any comments on this issue during either comment period, but is imposing this restriction in the final permit for the reasons stated above.

C. BACT Technology Review

The Air District also received a number of comments regarding its analysis of the control technologies available to reduce startup emissions. A number of comments criticized the Air District’s BACT technology review, claiming that certain technologies the Air District rejected should be required because they would result in lower BACT permit limits. Among the technologies cited in these comments were Fast-Start technology, which is an integrated system using a “once-through” steam boiler to reduce startup times; the use of an auxiliary boiler to keep equipment warm during shutdowns and therefore allow it to start back up more quickly; and Low-Load “turn down” technology (a version of which has been installed at the Palomar facility discussed above), which aims to reduce emissions at lower loads and may potentially be effective to reduce emissions as the turbines ramp up to full load during startups. The Air District has further analyzed these technologies in light of these comments, as follows.

1. “Fast-Start” Integrated Once-Through Steam Boiler Technology

Comment VIII.C.1. – Potential For Using Fast-Start Technology With Highly Efficient Triple-Pressure Steam Turbine Generating Equipment:

The Air District received a number of comments regarding “Fast-Start” once-through steam boiler technology. This technology uses an integrated design that eliminates the need for a steam drum as part of the combined-cycle operation, among other design features. This design avoids many of the elements that limit the speed with which the system can start up, such as having to heat up the steam drum. The Air District evaluated the potential for using this technology here in the Statement of Basis (*see* pp. 39-40), but found that it is not currently available for the more-efficient triple-pressure steam turbine designs utilized by facilities such as this one. Fast-Start technology is currently available for less-efficient single-pressure operations in an application known as “Flex-Plant 10”, which is appropriate for peaking-to-intermediate applications, but the Air District concluded that it would not be appropriate to require the facility to be redesigned to use such a system because it would be less efficient, among other reasons. An application for triple-pressure systems such as this one – known as “Flex-Plant 30” – is currently under development, but it is not yet available at this time.

The Air District published this analysis in its Statement of Basis and received comments asserting that “Fast Start” technology is available for combined-cycle facilities with higher-efficiency triple-pressure steam turbines of the type proposed for the Russell City facility. These comments claimed that the Siemens Flex-Plant 30 design is available and could be used for this facility. The comments cited two projects – the Lake Side Power plant in Utah and the Caithness Long Island Energy Center in New York – that they claimed use Flex-Plant 30 technology.²⁰⁶

Response: The Air District reviewed the situation regarding the availability of Fast Start technology in response to these comments. Siemens confirmed that no Flex Plant 30 has been constructed or proposed at this time for a full-scale power plant project. The term “Flex Plant” is used to describe a family of Siemens’ combined cycle “platforms” based on integration of one or more Siemens’ SGT6-5000F gas turbines, a Siemens integrated cycle design and HRSG specification, a Siemens steam turbine, and a Siemens SPPA-T3000 control system.²⁰⁷ Siemens representatives have confirmed to the Air District that the Lake Side and Caithness facilities both use the same 501F turbine technology and conventional triple-pressure boiler technology as proposed for Russell City, *i.e.*, they do not include a “once-through” Benson boiler.²⁰⁸ According to Siemens, “[n]either Lakeside [Power Plant] nor Caithness Long Island Energy

²⁰⁶ The Air District also received comments citing the District’s observation in a footnote in the initial Statement of Basis regarding retrofitting the facility to be able to accommodate an integrated design, as well as statements elsewhere during the permitting process that the costs involved would make the project financially unviable and would be contractually unworkable. These comments asserted that concerns about costs and retrofitting were the basis for the District’s determination not to require Fast-Start technology as BACT. These comments charged the District with basing its BACT determination on outdated technology instead of present-day BACT technology. The Air District disagrees with these comments. As explained above in Section II, the Air District is basing all of its BACT determinations on current technology. Moreover, the Air District has not taken the costs of Flex-Plant technology into account in its analysis of that technology, because it has concluded that it is not an available technology for this type of facility. The Air District’s observations about costs in this regard were not something that was relied on as part of the BACT analysis. The only places where cost-effectiveness has been taken into account in the District’s BACT analyses are specifically addressed in the relevant sections of this document.

²⁰⁷ Siemens Statement Regarding Available Siemens Technology Which Appear in Comments on RCEC’s Draft PSD Permit (“Siemens Technology Statement”), received by email from Candido Viega, Region Vice President, Pacific Northwest, Siemens Energy, Inc., to Richard Thomas, Calpine, March 16, 2009.

²⁰⁸ *Id.* The BACT analysis performed by the Utah Department of Environmental Quality’s, Division of Air Quality also suggests that the Lake Side Power Plant does not reflect advanced technology, as alleged by one commenter. The engineering analysis says that “[t]he project will consist of generating equipment in a configuration that has been permitted and is in use throughout the United States and the world.” *Engineering Review, Summit Vineyard, LLC, Lake Side Power Plant*, October 25, 2004, (hereinafter, “Lake Side Engineering Review”), at p. 5 (available at: www.airquality.utah.gov/Permits/DOCS/RN3031001-04.pdf).

Center (CLIEC) were represented as, nor [sic] sold as, a Flex Plant™ 30.”²⁰⁹ The Air District also contacted the plant manager from the Lake Side plant, who confirmed that the facility uses the Siemens 501F turbine with the latest FD3 technology, along with a conventional triple-pressure boiler and steam drum; the facility does not use a once-through boiler design.²¹⁰

The commenters’ confusion over whether the Lake Side and Caithness facilities use Flex-Plant 30 technology may have arisen because they both use an auxiliary boiler to keep the equipment warm during cold weather.²¹¹ The use of such an auxiliary boiler is common in colder regions where low temperatures can greatly prolong startups during cold weather, but such equipment does not constitute Flex-Plant™ 30 integrated plant design or similar “once-through” Benson boiler design. These two facilities do not, therefore, contradict the District’s conclusion that Flex-Plant 30 technology is not yet available.

Regardless of this distinction in the types of technology used at Lake Side and Caithness, however, the Air District interprets the commenters’ point to be that the Air District should consider whether to require the same type of technology used at those two plants to keep equipment warm and allow it to start up faster. The Air District considered the use of an auxiliary boiler as is used at Lake Side and Caithness, and its analysis is described in detail in subsection C.2. below. As noted below, however, the Air District found that an auxiliary boiler would not be required as a BACT control because the economic impacts in having to install and operate the auxiliary boiler render it inconsistent with BACT, given the relatively small additional emissions reductions it would achieve. The Air District is therefore not requiring an auxiliary boiler as used at Lake Side and Caithness.

The Air District published this additional investigation and analysis in the Additional Statement of Basis and solicited further public comment. During the second comment period it received comments expressing further disagreement that fast-start technology is unavailable for this facility. These comments stated that Siemens Fast-Start technology is being proposed for combined-cycle facilities that are currently under permitting review, such as the Willow Pass Generating Station and the Marsh Landing Generating Station. The Air District reviewed these facilities in response to these further comments, but disagrees that they are comparable. For Willow Pass and Marsh Landing, these applications proposed to use single-pressure steam turbines and in facilities designed for peaking-to-intermediate duty, unlike this facility (as some

²⁰⁹ Siemens Technology Statement, *supra* note 207. The Air District also received a comment referencing the proposed El Segundo Power Redevelopment project in connection with the Fast-Start discussion. The El Segundo project as currently planned will use a Siemens single-pressure combined-cycle design, not a triple-pressure design as with this project. (See Staff Report, El Segundo Power Redevelopment Project, Proceeding 00-AFC-14 (CEC, June 12, 2008), at p. 3-4 (“New Proposed Site Plan”), available at www.energy.ca.gov/2008publications/CEC-700-2008-006/CEC-700-2008-006.PDF.)

²¹⁰ Telephone conversation between Weyman Lee, BAAQMD Engineer, and John Bowater, Plant Manager, Lake Side Power Plant, April 8, 2008.

²¹¹ See, Lake Side Engineering Review, *supra* note 208, at pp. 6-7; Caithness Long Island Energy Center, *Environmental Impact Statement*, June 2005, at 9-35 – 9-36, available at: www.lipower.org/company/powering/caithness.html.

other commenters correctly pointed out).²¹² The Air District therefore disagrees that these proposed facilities show that Fast-Start is currently an available control technology for a triple-pressure facility such as this one, and has concluded that it is not required as a BACT technology here.²¹³

Comment VIII.C.2. – Use of Single-Pressure “Flex-Plant 10” Technology:

The Air District also received comments citing the Willow Pass and Marsh Landing facilities that are proposing to use Flex-Plant 10 technology and suggesting that the District should consider a Flex-Plant 10 system for this facility. Other comments took the opposite position, however, stating that Flex-Plant 10 technology is not appropriate for this type of facility. These comments stated that a Flex-Plant 10 system is appropriate for peaking-to-intermediate duty operations, whereas the Flex-Plant 30 system is the appropriate technology for intermediate-to-baseload operations. These comments were based on the observation that there is an energy efficiency penalty when using the single-pressure steam boiler system, compared with the more efficient triple-pressure system that will be used here. This situation was a key element of the Air District’s analysis that using Fast-Start technology would not be appropriate for this facility

²¹² See *Application for Certification, Willow Pass Generating Station*, June 2008, § 1.1 (“The FP10 units will be intermediate load power blocks, expected to operate at a 40 to 50 percent capacity factor...”); § 2.5.2 (“The design of the power plant will provide for operating flexibility (i.e., ability to start up, shut down, turn down, and provide peaking output) so that operations may be readily adapted to changing conditions in the energy and ancillary services markets.”), available at: www.energy.ca.gov/sitingcases/willowpass/documents/applicant/afc/Volume_01/; *Application for Certification, Marsh Landing Generation Station*, May 2008, § 1.1 (“The FP10 combined-cycle units will be intermediate load power blocks, expected to operate at a 40 to 50 percent capacity factor...”); § 2.5.2.1 (“The design of the power plant will provide for operating flexibility (i.e., ability to start up, shut down, turn down, and provide peaking output) so that operations may be readily adapted to changing conditions in the energy and ancillary services markets.”), available at: www.energy.ca.gov/sitingcases/marshlanding/documents/applicant/afc/Volume%20I/. Note that the applicant has submitted an amendment to its application, significantly changing the proposed facility’s design – from two Flex-Plant 10 units operated in combined-cycle mode and two simple-cycle units, to four simple-cycle units. *Application for Certification Amendment (08-AFC-03) for Marsh Landing Generating Station, Contra Costa County, California*, September 15, 2009, available at: [www.energy.ca.gov/sitingcases/marshlanding/documents/applicant/2009-09-15 Applicants Amendment to the Application for Certification TN-53293.PDF](http://www.energy.ca.gov/sitingcases/marshlanding/documents/applicant/2009-09-15%20Applicants%20Amendment%20to%20the%20Application%20for%20Certification%20TN-53293.PDF).

²¹³ The District also received comments stating that the CEC staff recommended Fast-Start in comments on the proposed facility. These comments cited Condition AQ-SC10 in the CEC’s license, which allows the use of Fast-Start technology as an alternative to complying with certain other conditions of certification. The comments implied that the CEC considers Fast-Start technology to be available and appropriate for this facility. The Air District disagrees with these comments. As the District has explained, Fast-Start technology is not currently available for this type of facility, and the CEC has not provided any information to the contrary. With respect to Condition AQ-SC10, although that condition allows the facility to use Fast-Start technology, it does not require it and does not suggest that it is in fact currently available for this facility.

because of the energy efficiency penalty associated with using a single-pressure steam boiler system.

Some comments objected to the Air District's comparison of single-pressure and triple-pressure steam turbine systems. These comments stated that the District's comparison (summarized in Table 13 of Statement of Basis) was based on the plants operating at full capacity, whereas the facility's operation will include startups and shutdowns, which the comments claimed would change the plant's efficiency level. The comments claimed that Westinghouse 501F turbines can be between 36.5% and 56% efficient, and that the Air District's comparison of this triple-pressure plant with the Flex-Plant 10's stated efficiency of 48% might come out differently if it is made at an efficiency different from the 56% efficiency value the District used.²¹⁴

A related group of comments stated that the District should not reject Flex-Plant 10 technology as inappropriate for this type of facility because they claimed that it is not clear what the facility's duty cycle will be. They stated that the frequency of startups and shutdowns is not known, and so it is not possible to tell whether the startup benefits of the Flex-Plant 10 technology will be outweighed by the energy penalty from using a single-pressure steam turbine instead of a triple-pressure turbine. Some commenters stated that the appropriateness of using a single-pressure system should be based on an analysis of the Power Purchase Agreement for the facility.

Response: The Air District agrees with the comments stating that a triple-pressure system is more appropriate for this type of facility, and disagrees with the comments stating that a Flex-Plant 10 system would be more appropriate here. Flex-Plant 10 is an excellent technology to allow peaking-to-intermediate plants – which have to be able to start up and come on line very quickly – to gain the benefits from using combined-cycle technology (as opposed to less efficient simple-cycle turbines). But it is not appropriate for intermediate-to-baseload facilities where quick startup times are less important because of the energy efficiency penalty associated with using a single-pressure steam turbine. For intermediate-to-baseload facilities, it is preferable to obtain the better overall emissions performance achievable through the use of a triple-pressure system instead of using a less efficient single-pressure system like the Flex-Plant 10. (Note that when Flex-Plant 30 technology becomes available it will allow suitable triple-pressure systems to achieve faster startups as well, but this technology is not yet available for this project.)

With regard to the relative efficiencies of a single-pressure Flex-Plant 10 system compared to a triple-pressure system, Air District reviewed its turbine efficiency information in response to this comment and has concluded that the commenter may be misunderstanding the efficiency ratings for these turbines. The 36.5% efficiency factor cited by the commenter for operation of an F-class turbine would be for operation in a simple cycle facility; that is, using the turbine only and not taking advantage of the waste heat in the turbine exhaust to generate steam for the combined-cycle heat recovery boiler. This facility is a combined-cycle facility that will have a heat

²¹⁴ Other comments claimed that that the Air District had identified Flex-Plant 10 technology as feasible but rejected it because of costs of disposing of existing equipment. This assertion is incorrect. The Air District rejected Flex-Plant 10 technology because it is not appropriate for a more-efficient triple-pressure plant such as this one.

recovery boiler to generate steam for additional electrical generation. The steam boiler that is being proposed here is a triple-pressure design that is more efficient than the single-pressure design used in the Flex-Plant 10 system. The Air District published this further explanation and analysis in the Additional Statement of Basis and invited further comment during the second comment period on these turbine efficiency issues. The Air District did not receive any further information or comment during the second comment period to suggest that its analysis is incorrect. The Air District has therefore concluded that requiring the facility to use a Flex-Plant 10 here would not be appropriate and is not required by BACT for this type of facility.

With regard to the comments on the facility's duty cycle, and whether it will actually be used as an intermediate-to-baseload facility where the need for efficiency trumps the need for fast startups, the Air District has considered this situation in detail as explained in Subsection VIII.D. below. As the Air District explains there, all indications show that the facility will be used for intermediate-to-baseload service, and there is no indication that the facility will be used as a peaker plant. The Air District has therefore found no reason to revisit its conclusion that requiring a less-efficient Flex-Plant 10 design would be appropriate here as a BACT requirement. The Air District disagrees that the facility should be designed to use this less efficient system, unless there is some demonstrated need for it such as achieving very short startup times as is required for peaking facilities. The Air District declines to interpret BACT to require this source to be redesigned in this manner, based on all of the information it has reviewed about how the facility will be used. The Air District refers commenters to Responses to Comments II.3. and VIII.D.1. for further discussion of this issue.

Comment VIII.C.3. – Potential For Using “Rapid Response” Technology:

The Air District also received some comments citing the corresponding fast-start system being developed by GE, the “Rapid Response” system. Some of the comments also reference the Oakley Generating Station, a proposed facility for which an application has recently been submitted which is proposing to use a GE Rapid Response system.

Response: The proposed Oakley Generating Station plans to use GE's new Rapid Response combined cycle (“CC”) integrated plant system.²¹⁵ GE's Rapid Response CC integrated plant system is designed to reduce startup emissions by eliminating many of the “holds” inherent in a conventional combined cycle plant's startup sequence, where the gas turbine is held at low-load for long periods so that the steam cycle equipment can be adequately heated and thereby avoid thermal stress and possible damage that might occur if the turbine were ramped-up to full load as quickly as it could be. The Rapid Response CC plant design accomplishes this through use of a patented, completely integrated plant system (an “Engineered Equipment Package”, according to

²¹⁵ See generally Application for Certification, Contra Costa Generating Station, California Energy Commission, Docket No. 09-AFC-4, June 30, 2009, (hereinafter “Oakley AFC”), at p. 5.1-9 (available at: www.energy.ca.gov/sitingcases/contracosta/documents/applicant/afc/index.php.)

GE), which has been designed to reduce the time it takes to ramp up the gas turbine to full load.²¹⁶

This new technology has only very recently been developed, however, and no Rapid Response CC plant has been constructed or is in operation.²¹⁷ Rather, GE is currently offering the Rapid Response CC integrated plant design for shipment to project sites in 2012 and anticipates that the first unit employing this integrated plant design will reach commercial operation in late 2013.²¹⁸ (The Oakley Generating Station is currently scheduled for commercial operation in the fourth quarter of 2013.²¹⁹) GE also confirmed that the earliest availability for delivery of the Rapid Response CC/7FA.05 system would be late 2012.²²⁰ This delivery timeline calls into question whether the system would be available for use at the Russell City Energy Center and therefore whether it should be considered at part of the BACT analysis. The applicant plans to commence construction at Russell City by September 2010 and anticipates a 30 to 33 month construction schedule that provides for delivery of the equipment to the site seventeen to nineteen months prior to commercial operation.²²¹ To keep on schedule, all major equipment is scheduled for delivery prior to the end of 2011.²²² Thus, acquiring the integrated Rapid Response CC system could involve substantial delay in the applicant's construction schedule, which calls into question whether this technology should be considered commercially available.²²³

Nevertheless, to be as conservative as possible, the Air District has considered the Rapid Response CC system to be available for this project and has evaluated it along with the other alternatives it looked at in the BACT analysis for startups. The Air District believes that the technology will likely achieve reduced startup emissions, although the exact extent of the improvement over current technology is difficult to quantify at this stage. As no facility has to date been equipped with the Rapid Response CC system, no facility has had an opportunity to demonstrate actual startup emissions performance. Moreover, the performance of existing combined-cycle facilities indicates significant variability in emissions between startup events, making it difficult to predict exactly what level of emissions this new technology will be able to achieve. And the experience of other projects representing "first-of-its-kind" combined cycle

²¹⁶ PowerPoint presentation, *GE Energy: Rapid Response Combined Cycle*, Gordon R. Smith (GE Power Plant Systems/Power Plant Engineering), Andrew Baxter (F-Technology Product Manager), September 24, 2007 (hereinafter, "Rapid Response PowerPoint").

²¹⁷ See Letter from Peter J. Bukunt, Account Executive, GE Energy Infrastructure, to Richard Thomas, Vice President, Calpine, re: GE207FA.05 Rapid Response Combined Cycle Plant, January 4, 2010 (hereinafter, "GE Letter"), at p. 1 ("In my email to you of March 13, 2009, I mentioned that, as of that date, no facility using GE's patented Rapid Response Combined Cycle (CC) plant design had been constructed or was in operation. This remains the case...").

²¹⁸ *Id.* ("we do not anticipate commercial operation of the first unit until the late 2013 time").

²¹⁹ Oakley AFC, *supra* note 215, at p. 2-32, Table 2.2-1.

²²⁰ GE letter, *supra* note 217, at 1 ("the earliest availability for delivery of the Rapid Response CC/7FA.05 system, if an order were placed at this time, would likely be late 2012").

²²¹ Schedule No. SCH-001, revision no. F, January 10, 2010, prepared by Bechtel, Frederick, Maryland, "Russell City, California, USA (2x2x1)- Combined Cycle," job no. 25483-001.

²²² *Id.*

²²³ In the context of the formal five-step Top-Down BACT Analysis, the technology would be eliminated at step two of the analysis if it is not yet commercially available for the project.

plants indicates that initial predictions of startup emissions are often inaccurate. For example, Inland Empire Energy Center (“IEEC”) recently requested an amendment of its California Energy Commission license to increase permitted emissions during startup events due to the facility’s failure to meet the existing limits.²²⁴ IEEC, which is a demonstration project for GE’s first 60-Hz H-class turbines, commenced commercial operation of one of its units on June 29, 2009. (The second unit was damaged during commissioning and is not expected to begin operating until early 2010.) The requested amendment in IEEC’s license would increase the permitted CO emissions during startups/shutdowns from 95 lbs/hr to 800 lbs/hr and from 300 lbs/event to 2,000 lbs/event – more than 8- and 6-fold increases, respectively. Increases in startup emissions of this magnitude, if applied to GE’s estimated emissions for the Rapid Response CC plant and 7FA.05 Advanced Gas Turbines, would in some cases exceed the BACT limits being established for Russell City. As reported by the Energy Commission’s notice concerning IEEC’s requested amendment, “the gas turbine startup/shutdown emission limits . . . were based on the best information available at the time that the permit was issued.”²²⁵ Indeed, sometimes even the best available information may not be a reliable indicator of actual emissions performance for technologies that have not previously been demonstrated. The Air District has therefore concluded that it would be difficult to assess exactly what level of emissions performance this new technology can achieve at this stage, although it appears that there would be an improvement over best work practices, the BACT technology choice that the Air District proposed at the draft permit stage and evaluated in the Statement of Basis and Additional Statement of Basis. Rapid Response would therefore be ranked as the top technology at Step 3 of the BACT analysis, ahead of best work practices.

The Air District therefore proceeded to Step 4 of the BACT analysis to determine whether there would be any ancillary energy, environmental or economic impacts that would counsel against choosing Rapid Response as the BACT technology choice. The Air District conducted a cost-effectiveness analysis and found that the costs associated with this new technology would be far greater than what can be justified under BACT relative to the emissions reduction benefits that would be gained. According to GE, implementing a Rapid Response CC system at Russell City would cost \$275-299 million.²²⁶ To be conservative, the Air District used the lower-bound of this estimate – \$275 million – in its analysis. The Air District also did not include the cost for certain elements of the integrated plant design that must be obtained from other vendors,²²⁷ but over which GE retains approval authority due to their impact on overall plant performance.²²⁸

²²⁴ See Notice of Receipt, Petition to Amend the Energy Commission Decision for the Inland Empire Energy Center Project (01-AFC-17C), December 14, 2009, Docket Log No. 54461; available at: [www.energy.ca.gov/sitingcases/inlandempire/compliance/2009-12-14 Notice of Receipt Regarding Petition to Amend CEC Decision TN-54461.PDF](http://www.energy.ca.gov/sitingcases/inlandempire/compliance/2009-12-14%20Notice%20of%20Receipt%20Regarding%20Petition%20to%20Amend%20CEC%20Decision%20TN-54461.PDF).

²²⁵ *Id.*

²²⁶ GE Letter, *supra* note 217, at p. 3

²²⁷ *Id.*

²²⁸ Rapid Response PowerPoint, *supra* note 216, slide 12 (indicating “GE approval of items impacting plant operability”, including “Aux boiler to GE spec”). Note, however, that the Air District has separately evaluated the discrete reductions that would be achievable through use of an auxiliary boiler.

By contrast, the estimated cost for the facility as proposed is approximately \$164 million.²²⁹ The additional cost for using GE's Rapid Response CC is therefore conservatively calculated at \$111 million, which equates to \$18,623,100 per year on an annualized basis when taxes, insurance and other administrative overhead costs are included.²³⁰ The Air District then compared this cost with the emission reduction benefits to be gained. As noted above, it is difficult to determine exactly what emissions performance can be achieved from this equipment given that no such systems are in operation and there is no actual operating data to evaluate. The Air District nevertheless evaluated several sources of information on the Rapid Response CC emissions performance and used the most conservative of them. GE's technical specifications for the 7FA turbine using Rapid Response CC provide estimated startup rates of 32 and 162 lbs NO_x and CO, respectively (indicated as "[p]rovided as estimates only").²³¹ The application for the Oakley Generating Station project is more aggressive, with hot/warm startup NO_x and CO emissions estimated at 22 and 138 lbs, respectively (with 96 lbs. NO_x and 540 lbs. CO, respectively, for cold startups).²³² The Air District used the estimates from the Oakley application to be more conservative. Applying these startup emission rates to the Russell City facility's 6x16 operating profile, the Air District concluded that GE's Rapid Response system could achieve as much as 14.8 tons of NO_x reductions and 201.4 tons of CO reductions per year.²³³ Comparing these potential reductions to the \$18,623,100 annualized cost of the Rapid Response CC system, the cost effectiveness calculation comes out to \$1.26 million per ton of NO_x reductions achieved and \$92,468 per ton of CO reductions achieved. These costs are well above what has been required at other facilities to achieve NO_x and CO reductions.²³⁴ The Air District has therefore concluded that Rapid Response should not be required here as BACT because of the economic and cost impacts it would have on the project.

²²⁹ Email from Alex Prusi (Director of Engineering, Calpine) to Barbara McBride (Director, Environmental, Health & Safety, Calpine), December 28, 2009.

²³⁰ See spreadsheet, "Cost-Effectiveness Analysis of Requiring Use of GE Rapid Response CC Plant Design for RCEC".

²³¹ The New 7FA – Technical Specifications", GE Energy (hereinafter "GE technical specifications"), available at: www.ge-7fa.com/businesses/ge-7fa/en/7FA-tech-specs.html.

²³² Oakley AFC, *supra* note 215, at 5.1-9, Table 5.1-6, "Rapid Response Startup and Shutdown Emissions Per Turbine", citing "Source: Radback-CCGS Team, 2009". Note that the Oakley application is still being processed and the proposed limits set forth in the application have not been determined to represent BACT at this stage. Moreover, the applicant has indicated that it may be revising its estimates upwards for purposes of establishing a not-to-exceed BACT permit limit that can be achieved at all times.

²³³ See spreadsheet entitled "Russell City Energy Center, Comparison of Emissions Reductions Resulting from Rapid Response CC System Assuming RCEC Operating Profile".

²³⁴ The CO cost-effectiveness threshold for purposes of the BACT analysis is discussed above in Section V. For NO_x, the Air District has a BACT cost-effectiveness threshold of \$17,500 per ton. (See BAAQMD BACT Workbook, Policy & Implementation Procedure, available at <http://hank.baaqmd.gov/pmt/bactworkbook/intro3.htm>.) For both of these pollutants, the costs associated with Rapid Response would be well above what any other permitting agency the Air District is aware of has ever required under BACT. EPA Region 4's National Combustion Turbine List, cited above in footnote 154, provides further evidence to support this conclusion.

2. Auxiliary Boiler Systems

Comment VIII.C.4. – Potential for Using Auxiliary Boiler To Reduce Startup Emissions:

As noted above in connection with the comments discussing the Lake Side and Caithness facilities, which use an auxiliary boiler, several comments raised the issue of whether the Air District should require an auxiliary boiler to be used to keep the HRSG and/or steam boiler warm while it is shut down, which would allow for reduced emissions on startup. Some comments stated that an auxiliary boiler would effect an overall reduction in emissions because any additional emissions from use of the auxiliary boiler would be *de minimis* compared to the startup emissions reductions that would be achieved. Other comments questioned a statement by Calpine in a memo submitted to the District that there is no room at the proposed project site for an auxiliary boiler. Some comments also stated that the CEC had opined that an auxiliary boiler would reduce startup times.

Response: In response to these comments, the Air District considered whether it should require an auxiliary boiler to be used on this project. The District analyzed the startup emissions benefits of using an auxiliary boiler here in the context of the additional costs that would be involved. The District compared startup data from Calpine’s facility in Mankato, Minnesota, a facility that is equipped with an auxiliary boiler. For some startups the plant uses the auxiliary boiler and for others it does not, and so the plant allows a direct comparison of the actual emissions reduction impact from using this technology. The data show that using the auxiliary boiler will reduce fuel usage (and consequently emissions) by approximately 18% for warm startups and approximately 31% for cold startups (with no impact on hot startups, as the HRSG and steam turbine are already at a high temperature).²³⁵ Assuming an annual operating profile containing 6 cold startups and 100 warm startups (a conservative estimate because actual startups will likely be lower), a similar reduction at Russell City from using an auxiliary boiler would result in 0.9 tons of NOx and 12.4 tons of CO per year.²³⁶ The Air District compared these potential emissions reductions to the costs of using an auxiliary boiler, based on a cost estimate provided by Calpine and reviewed by the District.²³⁷ That cost estimate showed that the annualized cost would be \$1,029,521 for the installation and operation of the auxiliary boiler. In terms of dollars-per-ton, these figures yield a cost-effectiveness number of \$1,143,912 per ton for the NOx reductions and \$82,800 per ton for the CO reductions. In light of these cost-effectiveness numbers, the costs of requiring an auxiliary boiler here would greatly exceed what any permitting agency would require in order to achieve this level of additional emissions reductions. (*See generally* Additional Statement of Basis at pp. 69-70.)

The Air District published this further analysis of the potential for using an auxiliary boiler in the Additional Statement of Basis and received a number of further comments on the issue. First, some comments provided vendor information that they claimed was used in developing the

²³⁵ See Excel spread-sheet entitled “Aux Boiler start profile DJ.xls”.

²³⁶ See *id.* Note that these reductions are net of the small additional emissions that would be generated by the auxiliary boiler itself. The Air District agrees with the commenters who stated that the emissions reductions from the auxiliary boiler would be more than offset by the startup reductions.

²³⁷ See Excel spread-sheet entitled “Aux Boiler-NOx-2.xls”.

Caithness permit conditions, which they claimed showed the emissions reductions that would be achieved from using an auxiliary boiler. These comments implied that this information provides a better measure of the benefits from using the auxiliary boiler than the information the District used. The comments offered an alternative calculation based on the emission reduction numbers from the Caithness vendor data, which they claimed show that using an auxiliary boiler could eliminate 89.9 tons per year of CO based on the Air District's assumptions regarding the facility's operating profile. Using this larger emissions reduction number, the comments stated that the cost-effectiveness should be calculated at \$11,515 per ton of CO reduced, which is approximately 8 times smaller than the number the Air District calculated. The comments claims that at this lower cost level, an auxiliary boiler should be required as BACT.

The Air District reviewed the vendor estimates cited in these comments and disagrees that they support an estimated reduction of 89.9 tons per year of CO from using an auxiliary boiler. The vendor's documents show that the estimated cold startup emissions at 51°F are 2,164 pounds of CO without the auxiliary boiler and 1,271 pounds with the auxiliary boiler, a difference of 893 pounds. For warm startups, the documents show emissions of 2,157 pounds of CO without the auxiliary boiler and 1,237 pounds with the auxiliary boiler, a difference of 920 pounds.²³⁸ Using these estimates, the annual emissions reductions come to 48.7 tons of CO, not the 89.9 tons calculated by the commenters. This amount of emission reductions would lead to a cost-effectiveness calculation of \$21,140 per ton of CO reduced, not the \$11,515 figure cited in the comments.

But even taking the numbers presented in these comments at face value, an auxiliary boiler would not be considered sufficiently cost-effective to require as BACT. Even \$11,515 is well above the costs of achieving a ton of CO reductions that the Air District found to be justified in its cost-effectiveness analysis in Response to Comment V.1. above. The Air District therefore disagrees with these comments that it should require an auxiliary boiler here to achieve additional startup reductions.

Second, the comments questioned the annual startup profile that the District used, suggesting that there may in fact be more startups per year than the 6 cold and 100 warm startups that the District assumed in its analysis because there are no permit limits on the number of startups per year. With more startups, these comments stated, the cost-effectiveness of using an auxiliary boiler would improve. The Air District disagrees with these comments. The operating profile the Air District used in its analysis is typical of normal operations of a "6x16" intermediate-to-baseload facility such as this one, and there is no indication that its operation will be significantly

²³⁸ See Siemens Westinghouse Power Corporation, *Caithness – Bellport Energy Center – Total Estimated Startup and Shutdown Emissions* (December 14, 2004), attached with letter from Jewell J. Hargleroad, Esq., to Weyman Lee, September 16, 2009. Note also that the commenters appear to be unfairly comparing the *average* emissions performance estimated by the vendor when using an auxiliary boiler with the *maximum* not-to-exceed emissions limit for Russell City without an auxiliary boiler. But the basis for their comparison is not entirely clear because the emissions numbers they cite are not found anywhere in the documentation they attached with their comments.

different.²³⁹ And even so, this number of startups is well below the number of warm and cold startups at which an auxiliary boiler would be required for purposes of a BACT emissions control technology.²⁴⁰ Even if the Air District’s assumptions about the facility’s operating profile were off by a factor of two or more – a highly unrealistic scenario – the Air District’s analysis would still show that an auxiliary boiler is not sufficiently cost-effective here. For all of these reasons, the Air District is not requiring the facility to use an auxiliary boiler here as a BACT technology for startups.

3. Low-Load “Turn-Down” Technology

Low-load “turn-down” technologies are products that allow better performance operation at lower than full load. As outlined above, the Air District has based its BACT limits on the emissions performance seen from the one facility that has installed a “turn-down” product designed to target startup emissions (as opposed to addressing other situations where a turbine might experience low loads), the Palomar facility in Escondido, CA. In this section, the Air District responds specifically to the comments it has received regarding “turn-down” technology as a BACT technology choice.

Comment VIII.C.5. – Use of Op-Flex Low-Load “Turn-Down” Technology:

A number of comments objected to the District’s determination not to require Op-Flex low-load “turn-down” technology as a BACT technology for reducing startup emissions. These comments noted that the Palomar facility in Escondido discussed above uses Op-Flex technology, and claimed that this fact demonstrates that the technology is technically feasible for reducing startup emissions. The comments also noted that CEC staff suggested that it should be required as BACT in a comment letter. Some comments claimed that if the Air District does not require Op-Flex technology to be used, as an alternative it should require the same level of startup emissions reductions as achieved by other facilities with Op-Flex.

Response: The Air District reviewed its assessment of Op-Flex in light of these comments. The Air District notes at the outset that the Federal PSD BACT requirement is ultimately an emissions limit, not a control technology *per se* (although, obviously, it must be based on the performance of the best available technology taking into account all relevant factors).²⁴¹ Based on the data that the Air District has reviewed from the Palomar facility that uses Op-Flex and early ammonia injection, the District has concluded that the Russell City facility will have

²³⁹ Some commenters have suggested that this facility will actually be operated as a “peaker” plant, but as addressed in detail in response to Comment No. VII.D.1., there is no evidence to support these claims.

²⁴⁰ Even taking the best cost-effectiveness number asserted in the comments (\$11,515 per ton), doubling the number of startups per year would improve the cost-effectiveness only to \$5,758 per ton, which is still well above the level at which BACT would require this technology to be used. Using other less optimistic calculations of cost-effectiveness, this point becomes even more striking.

²⁴¹ See, e.g., *In re Three Mountain Power*, 10 E.A.D. 39, 54-55 (EAB 2001) (BACT is an emission limitation not a control technology, and if two alternatives can achieve the same emissions performance the choice is essentially immaterial).

startup emissions that are the same as or lower than startup emissions achieved at Palomar. (See discussion in Response to Comment VIII.B.1., above.) The Air District therefore agrees with the comments stating that it should require the same level of startup emissions reductions achieved at facilities that have installed Op-Flex. The Air District disagrees, however, with the commenters who claimed that the Air District should specifically require the use of Op-Flex as a technology.

Moreover, the Air District does not find any reason to alter its BACT analysis of Op-Flex as not yet “available” for BACT purposes as an effective technology for reducing startup emissions. The Air District’s conclusion was based upon the lack of a manufacturer’s guarantee²⁴²; the limited nature of the data from the only facility using Op-Flex, which is not sufficient to allow a determination that Op-Flex really is achieving any significant reductions in emissions beyond what is already achievable using other approaches; and the fact that no other permitting agencies have ever found Op-Flex to be an achievable technology for reducing startup emissions for purposes of a BACT analysis. None of the comments provided any reason to reconsider any of these rationales. Some comments objected to the District’s observation that without a manufacturer’s guarantee the District cannot be certain that OpFlex will be able to achieve any particular level of emission reductions, and claimed that the District should use operational data as an alternative. These comments further stated that the data from Palomar provide a precise assessment of exactly what emissions reductions can be achieved from using OpFlex, and show that low-load turndown technologies are technologically feasible to reduce startup emissions. The Air District disagrees with these characterizations of the information from Palomar. The data is limited and preliminary at best, and it provides no firm indication of what reductions may have come from the use of Op-Flex, what reductions may have resulted from starting to inject ammonia earlier during the startup process, and what reductions may have come from other changes such as improved work practices. The Air District therefore continues to conclude that Op-Flex as not yet an available technology, and is appropriately eliminated in Step 2 of the Top-Down BACT analysis. But in any event, based on the additional analysis referred to above, even if the Air District were to address Op-Flex as an available technology in Step 3 of the Top-Down analysis, there is no indication based on the available data that it should be ranked higher than the alternative the District ultimately selected, best work practices. For all of these reasons, the Air District disagrees that Op-Flex should be required as a condition in the permit for this facility.²⁴³

²⁴² Some commenters questioned whether the District should have undertaken further investigation into GE’s claims that it will not guarantee startup emissions performance for turbines using its OpFlex system because startup emissions are highly variable and depend on specific plant equipment and configuration. But the manufacturer has informed the Air District that it will not do so, as explained in the Statement of Basis, and the comments have not provided any reason (beyond mere speculation) to the contrary.

²⁴³ Comments also stated that the CEC found that Calpine rejected OpFlex because of the associated cost, and stated in this context that the District needs to ensure that its BACT analysis is untainted by considerations of things like costs. The District disagrees that cost was a part of the District’s analysis of Op-Flex technology. The commenter has not identified any element of the Air District’s BACT analysis regarding Op-Flex that is based on cost, and the District has not found any either. The Air District published this further explanation in the Additional Statement of Basis (p. 72, fn 131) for further comment during the second comment period, but did not

Comment VIII.C.6. – OpFlex Comments in EPA Region IX Colusa Permit Proceeding:

The Air District also received comments that disagreed with the District’s assertion that EPA Region IX does not require OpFlex as BACT, based on the permit Region IX issued for the Colusa Project. The comments noted that a commenter in the Colusa proceeding brought the issue to the Region’s attention in a comment, but that the comment was withdrawn and so Region IX did not consider it. The comments requested that the District consider the comments that were submitted and subsequently withdrawn in the Colusa proceeding here.

Response: The Air District agrees that EPA Region IX did not formally respond to the withdrawn comments on the record. But once the issue had been brought to EPA’s attention in the comments, the agency would not (and legally could not) fail to require OpFlex technology if that technology were BACT. The agency has an independent responsibility to impose BACT based on information brought to its attention in a comment, even if the comment that brought the issue to light is subsequently withdrawn. For this reason, the District stated in the initial Statement of Basis that EPA Region IX did not require OpFlex as BACT.²⁴⁴

Moreover, although the Air District pointed out that EPA had not required the use of OpFlex as BACT at Colusa, the Air District conducted its own case-by-case evaluation and reached its own independent conclusion that BACT does not require that OpFlex technology must be used here as a condition of the permit (although as noted above the Air District has found that the permit limits it is imposing are as stringent as the emissions performance that has been achieved at the one facility using an OpFlex product for startups). That analysis, as further considered the Additional Statement of Basis and in this Response to Comments document, provides a sufficient basis for the current permitting action regardless of EPA Region IX’s analysis. The District continues to believe that EPA Region IX’s conclusions lend further credence and support to its analysis, however.

Finally, as for considering the Colusa comments that were withdrawn, the Air District obtained a copy of the comments from EPA Region IX to ensure that it had researched all information that could have bearing on this issue, and found nothing whatsoever in those comments to suggest that OpFlex should be required here. The comment letter cited several of the same points about

receive any further comment pointing to any area in the District’s analysis where Op-Flex technology was rejected based on costs.

²⁴⁴ The same commenter also suggested that U.S. EPA Region 9’s decision (or lack thereof) not to require OpFlex™ in the PSD permitting decision for Colusa Generating Station was irrelevant to the Air District’s decision because the proposed Russell City Energy Center would be located in a populated metropolitan area designated as nonattainment for certain National Ambient Air Quality Standards. The Air District notes that the suggestion implicit in this comment – that the BACT standard should apply differently between a location in a “major metropolitan area” and one outside such an area – is without any basis in the federal PSD regulations. Further, to the extent that the commenter intended to suggest that PSD permits should not be issued or the BACT standard should be applied differently for sources located in non-attainment areas, the Air District notes that such sources are subject to non-attainment New Source Review for non-attainment pollutants.

the Palomar Energy Center that have been raised in this proceeding, to which the Air District is responding in detail in this section.

The Air District published this further explanation of its view of the Colusa permit proceeding in the Additional Statement of Basis and solicited further public comment on this issue. The commenters who suggested that the Air District consider the Colusa comments submitted further comments during the second comment period stating that the Air District had not adequately analyzed them. These further commenters did not explain any area in which the Air District's response was not adequate, however. The comments also claimed that the Colusa permit has been reopened for modification, although they did not explain how that would impact the Russell City permit. The Air District disagrees that there is anything in these further comments to alter the permitting analysis on these issues. EPA is currently reopening the Colusa permit to make minor amendments, but these proposed amendments do not involve the startup limits and would not require the facility to install an OpFlex system.²⁴⁵

Comment VIII.C.7. – Availability of Siemens Low-Load Turn-Down Product:

Another comment claimed that, based upon telephone conversations with Siemens representatives, a low-load “turn-down” technology product is currently available for Siemens turbines.

Response: The Air District investigated this issue further and reviewed communications from Siemens confirming in writing that it does not have a low-load product that is commercially available for F-class turbines. Siemens' low-load product, known as “Low Load Carbon Monoxide” (LLCO), has been validated for G-class turbines as noted in the documentation the Air District relied on in the initial Statement of Basis. (*See* Statement of Basis at p. 41 and n. 33.) The Air District confirmed this with Siemens in response to this comment. Siemens reports that “LLCO validation for F-class turbine began in December 2008 and [is] currently in process [but] the validation for the F-class turbine has not been concluded.”²⁴⁶ The Air District published this further explanation and analysis in the Additional Statement of Basis and received no further comments on this issue.

²⁴⁵ *See* Proposed Amended Permit Conditions, Colusa Generating Station, PSD Permit No. SAC 06-01, available at www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480a1ee9e (redline version showing proposed changes).

²⁴⁶ *See* Siemens Technology Statement, *supra* note 207. Further, for the reasons discussed in the section of this document on the Air District's BACT analysis for greenhouse gas emissions (Section III), the Air District has found that use of G-class turbines in place of the Applicant's proposed F-class turbines does not constitute BACT for Russell City Energy Center. Rather, as discussed in that section, use of G-class turbines for a proposed nominal 600 MW combined-cycle power plant would require installation of a substantially smaller steam turbine, which would result in a significant reduction in the plant's overall efficiency rating. In light of the ancillary environmental and energy impacts that would result from this efficiency loss, the Air District in not requiring the use of G-class turbines as BACT for this project.

4. Miscellaneous BACT Technology Choice Issues

Comment VIII.C.8. – Use of “Best Work Practices” As BACT for Startups:

Some comments objected to the selection of Best Work Practices as the BACT control technique, characterizing this approach as simply following ‘operating instructions’.

Response: Optimizing a facility’s operating procedures to implement best work practices is an effective and well-accepted method of minimizing emissions from startups and shutdowns.²⁴⁷ Moreover, as described in more detail in these Responses to Comments, and in the Statement of Basis documents that the Air District has published previously, the use of best work practices in this case will allow the facility to comply with the BACT emissions limits that the Air District is imposing in the final permit. The Air District does not find that commenter’s characterization of this approach to minimizing emissions provides any reason to alter its BACT analysis. The Air District published this further justification and analysis in the Additional Statement of Basis, but did not receive any further comments.

Comment VIII.C.9. – Future Consideration of Emerging Startup Technologies:

Some comments questioned whether the District will be monitoring improvements in startup technologies for future modification of the permit for this facility, or for use in future permits.

Response: The District will be monitoring improvements in power plant startup technologies for all power plant permits it issues, both for new facilities and for modifications to existing facilities including the Russell City facility. If the applicant seeks a significant permit modification in the future that requires an upgrade of BACT technology, the District will require the state-of-the-art technology available at that time. The BACT requirement imposes an obligation on permitting agencies to review technological improvements and to impose emissions limits based on the state of the art at the time of permitting, which is what the Air District has done here as explained in the BACT analyses and justifications it has provided in this proceeding.

Comment VIII.C.10. – Use of Solar Technology to Reduce Startup Emissions:

The Air District also received comments stating that the CEC had opined that the use of a solar array could reduce startup times, and otherwise suggesting that a hybrid solar facility would be appropriate to control startup emissions.

Response: The Air District considered the potential for incorporating a hybrid solar design and other solar technologies above in Section II regarding the currentness of the generating technology for this plant and in Section III regarding greenhouse gas BACT and energy

²⁴⁷ See, e.g., Memorandum from John B. Rasnic, Director, Stationary Source Compliance Division, Office of Air Quality Planning and Standards, U.S. EPA, to Linda M. Murphy, Director, Air, Pesticides and Toxics Management Division, U.S. EPA Region I (Jan. 28, 1993); Memorandum from Kathleen M. Bennett, Assistant Administrator for Air, Noise, and Radiation, U.S. EPA, to Regional Administrators, Regions I-X (Feb. 15, 1983); Memorandum from Kathleen M. Bennett, Assistant Administrator for Air, Noise, and Radiation, U.S. EPA, to Regional Administrators, Regions I-X (Sept. 28, 1982).

efficiency. As addressed in those sections, even if solar alternatives could be made a part of the BACT analysis without impermissibly redefining this source, solar technologies would not be an available alternative here given the space constraints and other limitations associated with this project. For the same reasons why solar technologies would not be appropriate BACT alternatives discussed in response to those comments, the Air District disagrees that solar technologies would not be appropriate BACT alternatives with respect to reducing startup emissions.

D. Frequency of Startups And Implications For BACT Analysis

Comment VIII.D.1. – Number and Frequency of Startups/Shutdowns:

The Air District also received comments expressing a concern that the facility may have frequent startups and shutdowns. These comments noted that the Air District is permitting this facility as an intermediate-to-baseload facility, but stated that the facility could be used in a “peaking” mode, meaning it would remain idle most of the time but could be started up and shut down frequently to respond to short-term changes in demand. Some comments inferred from the proposed daily emissions limits and from CEC documentation that normal operation could include one or two hot startups per day.²⁴⁸ The comments stated that the District needs to establish a credible scenario of likely startup and shutdown events, and base its permitting analysis on that scenario. Some comments stated that the District should base its analysis of the facility’s operating profile on what is provided in the facility’s power purchase agreement. In particular, some comments objected to the Air District’s elimination of Flex-Plant 10 technology in the BACT technology analysis based on concerns about the facility’s operating profile. As noted above in Response to Comment VIII.C.2., these comments stated that the Air District should not rule out requiring Flex-Plant 10 technology, which offers reduced startup emissions but at the expense of energy efficiency and overall emissions performance, unless the Air District can establish with more certainty that the facility will in fact be used in an intermediate-to-baseload capacity. Other comments expressed similar concerns about the operating profile the Air District used in determining that an auxiliary boiler would not be sufficiently cost-effective in reducing startup emissions. As noted above in Response to Comment VIII.C.4., these comments stated that if the facility was operated in a peaking mode and had more frequent

²⁴⁸ Some comments noted that the Russell City facility is expected to be a fast-ramping flexible combined cycle project, and that according to PG&E, Russell City will have operational flexibility that will help PG&E integrate intermittent renewable resources into PG&E’s portfolio. These comments implied that the facility may not remain in use all the time, but may shut down to allow renewable resources to be used when they are available and then start up again to fill in gaps when the sun is not shining or the wind is not blowing, for example. Although renewable portfolio goals are not directly related to any PSD permitting requirements, to the extent that this facility can help transition California to a renewable power generation portfolio, the Air District agrees that this is a worthy goal. To the extent that these characterizations are correct, however, the Air District does not consider this attribute of the facility to be inconsistent with the facility’s design as an intermediate-to-baseload facility, and the comment has not provided any explanation why it should be considered inconsistent. Intermittent use to help integrate intermittent renewable resources is not inconsistent with intermediate-to-baseload operation.

startups than the Air District assumed in its analysis, an auxiliary boiler might be sufficiently cost-effective to warrant requiring it here as BACT.

Based on these concerns, some of the comments stated that the Air District should impose limits on the number of startups and shutdowns for the facility to ensure that it is not used as a peaking facility. Some comments also objected to having startup and shutdown emissions subject to the annual emissions limit in the permit, on the grounds that an annual cap will allow the facility to over-control steady-state emissions to allow higher startup and shutdown emissions. These comments stated that startup and shutdown emissions will contribute to short-term air quality impacts, which are not addressed by an annual limit.

Response: The Air District has reviewed the facility as proposed and has not found any indication that it is not in fact being built for intermediate-to-baseload operation. To the contrary, all available information suggests that it will be used for intermediate-to-baseload operation.

One clear indication is that the facility has been designed and proposed to maximize energy efficiency, which is being prioritized over fast start times. This tradeoff between a low heat rate (an indication of energy efficiency) and quicker startups times is what determines how power plants are dispatched – that is, whether they are kept on-line or whether they are turned off when demand is not at its peak. Whether and when plants are turned on to provide power to the grid is determined by the California Independent System Operator (“ISO”), which ensures that the state’s electricity grid operates reliably at all times. A particular plant’s position in the “dispatch order” is determined primarily by how efficiently it can generate electricity, along with how long it will take for the plant to start up to meet the grid’s needs in the short term. The ISO keeps the plants with the lowest heat rate (highest energy efficiency) online the longest, as when demand falls it obviously makes the most sense to shut down the higher heat rate (lower efficiency) facilities first. Those that the ISO dispatches only to respond to short-term spikes of the highest demand, by contrast, are those with short startup times that can come on-line quickly in times of immediate need; in those situations, higher heat-rate (lower efficiency) facilities can be used because they do not need to operate as long and so the higher costs and emissions from having to burn more fuel per megawatt of power generated are not as much of a concern. For these reasons, it is a fundamental truth about way in which power plants are dispatched that highly efficient plants with low heat rates such as this one will be used primarily for baseload and intermediate service, and not for peaking service where the less efficient, higher-heat-rate facilities are dispatched to meet short-term peak periods of high demand. The Air District therefore disagrees based on the design of the facility that this facility will be used as a peaker plant, as the comments suggested.

The Air District also disagrees that this facility will be used as a peaker plant based on its review of available information from the record of proceedings before other California regulatory agencies. The information the Air District discovered strongly supports the conclusion that this facility will be an intermediate-to-baseload facility. For example, the California Public Utilities Commission (“CPUC”) has expressly made a finding that the facility is subject to California’s CO₂ Emissions Performance Standard (“EPS”), which applies only to “baseload generation facilities designed and intended to provide electricity at an annualized plant capacity factor of at

least 60 percent.”²⁴⁹ Similarly, in related regulatory proceedings concerning the approval of a natural gas pipeline project, PG&E described the Russell City facility and two other highly efficient facilities as having “the lowest heat rates of all the units in PG&E’s portfolio” and therefore requiring “the most steady demand” for natural gas supply to meet the needs of PG&E’s customers, further suggesting that these facilities – including Russell City – will be dispatched in an intermediate-to-baseload capacity.²⁵⁰ PG&E’s testimony further supports the CPUC’s classification of the proposed facility as a “baseload generating” facility with an assumed 60% or greater capacity factor, and thus the Air District’s conclusion that this facility will not be used as a peaker plant.²⁵¹

Finally, the Air District also reviewed the Power Purchase Agreement for this facility for indications of how the facility will be dispatched, as some of the comments suggested. The Power Purchase Agreement requires that the facility be available for dispatch on a “6 x 16” basis, meaning that it has to be available to operate at least 16 hours a day, 6 days a week.²⁵² This dispatch requirement is typical for an intermediate-to-baseload facility, and is not the type of dispatch requirement that would be seen in a Power Purchase Agreement for a peaker plant. This is also the operating scenario on which Calpine has agreed to provide NOx offsets for the facility. It is unlikely that Calpine would provide NOx offsets to accommodate this level of operation if the facility were actually intended to be operated as a peaker with far fewer total hours of operation per year.

²⁴⁹ See Decision Approving Settlement Agreement Regarding the Second Amended and Restated Power Purchase Agreement, California Public Utilities Commission, April 16, 2009, Decision 09-04-010, Issued April 20, 2009, Application of Pacific Gas and Electric Company for Expedited Approval of the Amended Power Purchase Agreement for the Russell City Energy, Application 08-09-007 (Filed September 10, 2008) Company Project (U39E), pp. 34-35; available at: http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/100001.pdf. (“In January 2007, the Commission adopted the Emissions Performance Standard (EPS), which requires that baseload generation facilities designed and intended to provide electricity at an annualized plant capacity factor of at least 60 percent demonstrate that the net emissions rate of each baseload facility underlying a covered procurement is no higher than 1,100 lbs. of carbon dioxide (CO₂) per megawatt hour. Based on the definitions provided in the EPS decision, the RCEC contract is a covered procurement.”)

²⁵⁰ Pacific Gas and Electric Company, Request for Approval of Ruby Pipeline Transportation Arrangements, Prepared Testimony, Supplemental Testimony, Electric Fuels Department, Application 07-12-021, U 39 M, February 15, 2008, p. 8; available at: https://www.pge.com/regulation/RubyPipeline/Testimony/PGE/2008/RubyPipeline_Test_PGE_20080215-01.pdf.

²⁵¹ Regarding the comments citing the Energy Commission’s references to multiple daily startups in its Staff Assessment, this scenario was used to determine the *daily maximum* emissions that could occur on a single day for purposes of setting a not-to-exceed daily emissions limit. Use of this assumption to establish the maximum daily emissions limit does not mean that the Energy Commission believes that the two startups per day will be a common occurrence.

²⁵² See Second Amended and Restated Power Purchase and Sale Agreement between Pacific Gas & Electric Co. and Russell City Energy Co., LLC, Appendix II.

For all of these reasons, the Air District concludes that there is no indication that this facility will be used as a peaker plant with low overall usage but a high number of startups and shutdowns. The Air District therefore disagrees with the comments suggesting that the facility will be operated in this manner.

With respect to requiring the facility to be designed using a single-pressure steam turbine system in order to accommodate Flex-Plant 10 technology, the Air District disagrees that this would be appropriate here or required under a BACT analysis. As noted above in response to Comment VIII.C.2., given the energy penalty associated with switching to the single-pressure design used in the Flex-Plant 10 technology, a Flex-Plant 10 would actually result in greater emissions overall from this facility, even though startup emissions could be reduced. Moreover, a permitting agency cannot require an applicant to redesign its proposed source in this way under the BACT requirement. The triple-pressure system this facility incorporates – with its low heat rate (high efficiency) that will allow it to be used effectively as an intermediate-to-baseload facility – is an inherent design element of the facility and is integral to the facility’s fundamental purpose. BACT cannot require an applicant to redesign a source to change this fundamental design element.

With respect to requiring the facility to use an auxiliary boiler, the Air District disagrees that it would be appropriate here given the high cost and relatively low emissions reduction benefit that could be achieved, as noted above in response to Comment No. VIII.C.4. As discussed there, an auxiliary boiler would not be sufficiently cost-effective to be required as a BACT technology. There is no indication from the Air District’s review of how this facility will be operated that would alter the Air District’s analysis on this issue.

Finally, with regard to whether the Air District should impose a specific numerical limit on the number of startups and shutdowns the facility may have, the Air District disagrees that this would be an appropriate application of the BACT requirement. Power plants need flexibility to be dispatched as determined by the ISO in order to ensure a reliable and efficient electrical grid, and a specific limit on the number of times a facility can start up and shut down over a given period of time would hinder that goal. Moreover, the number of startups and shutdowns are already subject to indirect limits because startup and shutdown emissions are included in the daily and annual limits the facility will be subject to. The Environmental Appeals Board has approved of such an approach as sufficient to satisfy BACT for startup emissions, even in the absence of stringent numerical limits on emissions per startup as the Air District is imposing here.²⁵³ For both of these reasons, the Air District disagrees that a specific numerical limit on the number of startups and shutdowns would be appropriate.

Similarly, the Air District disagrees with the comments that it is inappropriate to include startups in the annual emissions cap. As noted above, the Environmental Appeals Board has supported such an approach as an appropriate means to address startup emissions for purposes of the BACT

²⁵³ *In re Sumas Energy 2 Generation Facility*, PSD Appeal Nos. 02-10 & 02-11 (Order Remanding in Part and Denying Review in Part), Slip Op. at pp. 19-20 (March 25, 2003); *In re Sumas Energy 2 Generation Facility*, PSD Appeal No. 05-03 (Order Denying Review), Slip Op. at pp. 21-22 (May 27, 2005).

requirement. The Air District also points out that startups will not only be subject to the annual emissions limits, but will also be included in the facility's daily emissions limits, as well as the specific limitations on the emissions per startup outlined above. Even if the facility were to over-control its steady-state emissions such that it has extra room under its annual cap, startup emissions will still be subject to these additional limits. These limits will ensure that short-term emissions impacts are minimized to the greatest extent achievable, consistent with BACT and the protection of ambient air quality. This is not a case of either annual limits or short-term limits, as these comments seem to suggest. Rather, it is a case of multiple emissions limits addressing this issue, which will impose restrictions both on short-term and long-term emissions.

IX. COMMISSIONING PERIOD ISSUES

Comment IX.1. – Length of Commissioning Period:

The Air District also received comments stating that it should require a shorter commissioning period. The comments claimed that the data the District reviewed demonstrates that a shorter time is feasible, citing examples in the data of 96 hours and 207 hours taken to commission certain other turbines.

Response: The Air District disagrees that the data it reviewed show that a shorter commissioning period is feasible. The data show that the time required for commissioning varies greatly from turbine to turbine, and that a reasonable allowance must be made for this variability. The data the Air District evaluated show that although on occasion facilities have been able to complete commissioning in as little as 96 hours, on other occasions they have required as long as 297 hours. Based on this data, as well as the Air District's review of the applicant's estimate of the time that will be required, the Air District concluded that 300 hours is a reasonable time limit. The Air District therefore disagrees with this comment that a shorter time period is feasible as a BACT requirement. The Air District published this further justification and rationale in the Additional Statement of Basis and did not receive any further comment from any member of the public during the second public comment period.

X. SULFURIC ACID MIST ISSUES

Comment X.1. – Sulfuric Acid Mist Emissions and Compliance with PSD Requirements:

The Air District received comments questioning the District's assertion that emissions of sulfuric acid mist are difficult to estimate because the conversion of fuel sulfur to SO₃ and then to H₂SO₄ is not well established. These comments suggested that the District should be in a position to explain more precisely what actual sulfuric acid mist emissions will be. The comments also questioned whether the facility will in fact emit less than the 7 tons-per-year PSD significance threshold. In addition, some comments claimed that the permit should limit sulfuric acid mist emissions to less than 38 pounds per day.

Response: In the initial Statement of Basis and Additional Statement of Basis, Air District explained that it had estimated sulfuric acid mist emissions as accurately as it can, and believes that emissions will be below 7 tons per year. In light of further comments received on this issue, the Air District conducted an additional review of available data on sulfuric acid mist emissions that would be expected from this facility, and has concluded that its initial analysis is sound. The Air District reviewed a recent sulfuric acid mist source test result from a similar power plant that showed an average 8% conversion of fuel sulfur to sulfuric acid mist.²⁵⁴ Based on that test result, the Air District assumed a 10% conversion factor and assumed a fuel sulfur content of 0.25 grain/100 ft³, which is the maximum permitted annual sulfur content pursuant to Permit Condition 12. Based on these assumptions, the Air District estimates that sulfuric acid mist emissions will be up to 2.1 ton/year for both power trains, which is well below the 7 ton/year PSD significance threshold level. The Air District is not aware of any other data or analysis suggesting that emissions will be over 7 tons per year, and none of the comments on this issue cited any, and so the Air District continues to believe that this is an accurate assessment.

Moreover, the Air District is not simply relying on this estimate to ensure that emissions will in fact be below 7 tons per year. The permit includes an enforceable sulfuric acid mist limit to ensure that emissions stay below this level, and the facility will be required to conduct compliance testing to ensure that they do. This testing requirement will ensure that actual emissions are below 7 tons per year, regardless of the accuracy of the Air District's estimate.

With respect to the need for a daily 38-pound emissions limit, EPA's Federal PSD permitting requirements regulate sulfuric acid mist on an annual basis and require annual emissions to be below 7 tons per year if a BACT analysis is not conducted. The Federal PSD requirements in 40 C.F.R. section 52.21 do not break that 7 ton/year threshold down into a daily emissions limit. Moreover, even if there was a daily 38-pound limit, the facility would still more likely than not remain below even that daily emissions number given how much of a margin it has below the applicable limit in the annual emissions calculations outlined above. For all of these reasons, the Air District disagrees that the facility will exceed the PSD significance threshold for sulfuric acid mist and concludes that the facility does not trigger PSD regulatory requirements for this pollutant.

²⁵⁴ Source Test Results, Gateway Generating Station, Jan. 4-14, 2009.

Comment X.2. – Sulfuric Acid Mist Compliance Testing:

The Air District also received comments questioning whether annual compliance testing will be adequate to ensure compliance with the 7 tpy permit limit. The comments suggested that the facility might simply retest in the absence of oversight until compliance is demonstrated. The comments suggested that the District establish specific test dates to prevent test manipulation by retesting.

Response: The Air District considered this issue as well, and notes that the permit conditions require all non-compliance to be reported to the Air District. (*See* Permit Condition No. 37.) Thus, any non-compliance discovered during a compliance test will be reported, and the facility will not be allowed to keep a failed test secret and conduct a further test to show compliance. The Air District has therefore concluded that the compliance testing requirements as proposed will not allow the potential for test manipulation by retesting. The Air District published this further justification and analysis in the Additional Statement of Basis and did not receive any further comments from any members of the public on this issue during the subsequent comment period.²⁵⁵

Comment X.3. – Information on Sulfuric Acid Mist Testing:

The Air District received comments citing a paper on new methodologies for estimating total sulfuric acid emissions from power plants. The commenters did not explain how this information pertains to this permitting action, however.

Response: The Air District acknowledges receipt of this comment. The Air District is unclear as to why the commenters consider this paper relevant, however, as the comments did not explain how this information pertains to this permitting action. The Air District has reexamined the issue of sulfuric acid testing methodologies, however, to the extent that these comments were intended to question the testing methodologies that will be used to determine compliance with the permit limits. The Air District notes in this regard that any testing methodology must be approved by the Air District. This approval requirement ensures that the Air District can require the most accurate and up-to-date testing methodologies to be used. The Air District therefore acknowledged the information provided by these comments in the Additional Statement of Basis, but explained that there was nothing in the information to suggest that the proposed permit conditions should be changed in some way. The Air District solicited further input on this issue in the Additional Statement of Basis, but did not receive any further comments during the second public comment period.

²⁵⁵ The District did receive a letter after the close of the second comment period stating that the sulfuric acid mist limit of 7 tons per year would be unenforceable as a practical matter. The letter based this conclusion on an assertion stated that the standard sulfuric acid mist test methods are not accurate, and may not be able to detect emissions at levels as low as 7 tons per year. This communication was not received during the comment period and is therefore not a formal comment that the Air District is obligated to respond to. The Air District notes, however, that current test methods are detecting sulfuric acid mist at levels below 7 tons per year, as evidenced by the Gateway Generating Station test results. (*See id.*)

XI. DIESEL FIREPUMP ISSUES

Comment XI.1. – Restrictions on Diesel Firepump Hours of Use:

The Air District received comments regarding the backup diesel firepump engine stating that there would be no restriction on the engine being used only for emergencies. The comment noted that the proposed permit conditions would allow the firepump engine to be operated for reliability, but contended that this means that the diesel firepump can be used as a backup for the combustion turbines and heat recovery boilers. The comments claimed that the firepump engine's emissions will be uncontrolled as a result of this situation, and stated that the District should reduce the allowable operating time of this engine as much as possible and limit its use to only emergencies.

Response: The Air District disagrees that the permit will allow the firepump to be used for non-emergency purposes (except for short periods as necessary for testing, maintenance, and reliability purposes). The permit conditions explicitly limit operation to emergencies and for these specific, necessary non-emergency purposes, and to an annual total of 50 hours for non-emergency uses. Moreover, it would not be possible to use the diesel firepump engine as a backup for the turbines even if the permit allowed for such a use. The firepump engine is rated at 3400 hp, which is the equivalent of around 2.5 MW. This level of output simply could not serve as a backup for a 200 MW combustion turbine.

Comment XI.2. – Use of Electric Motor For Firepump:

As noted above the discussion of greenhouse gas BACT analysis for the diesel firepump, the Air District received a comment suggesting that the District consider requiring an electric firepump instead of a diesel firepump to reduce emissions.

Response: The Air District incorporates its response from the greenhouse gas BACT analysis. As stated in that response, the facility is required to have both an electric power supply and a diesel power supply because of fire safety requirements established by the NFPA. The Air District therefore disagrees that it could require an electric motor in the BACT analysis. Requiring an electric motor instead of a diesel engine would impermissibly redefine the source, and so it would not even be considered as an available technology in the BACT analysis. Moreover, even if the Air District were required to analyze the use of an electric firepump under the BACT analysis, it would eliminate it at Step 2 in the top-down BACT analysis as not feasible for the fire protection purposes it will be serving at this facility.

XII. MONITORING ISSUES

The Air District also received some comments on the proposed monitoring requirements for the facility. The Air District has conducted further review and analysis of the proposed monitoring requirements, as explained below.

Comment XII.1. – Monthly Sulfur Monitoring:

The Air District received comments claiming that the proposed monthly monitoring of the sulfur content of the facility's natural gas fuel is not frequent enough. The comments claimed that the sulfur content of the natural gas can vary significantly from one quarter to another (citing data tabulations from PG&E's website), and stated that for this reason enhanced monitoring should be required. The comments claimed that the District should require weekly sulfur monitoring in order to ensure accurate monitoring of sulfur content.

Response: The Air District considered this issue further in light of these comments, and has concluded that weekly monitoring is not necessary to ensure compliance with the natural gas sulfur limits. The comments claim that sulfur content can vary from quarter to quarter, but even if this is so, a monthly testing requirement will be able to track such variations. The comment did not point to any evidence that the additional data that could be gained from weekly monitoring would be worth the additional burden of doing so, and the Air District is not aware of any. The Air District published this additional justification and rationale in the Additional Statement of Basis, but did not receive any further comments from any member of the public on this issue during the second comment period.

Comment XII.2. – Use of PG&E Sulfur Data:

The Air District also received comments that criticized its proposal to allow Russell City to use PG&E's monthly gas sulfur content measurements if Russell City can show that they are 'representative'. Some comments claimed that there are no objective criteria specified in the permit conditions as to what qualifies as 'representative'. Some comments also claimed that PG&E adds chemicals to its natural gas and does not assure the accuracy of its published information. The Air District also received comments stating that ASTM fuel sulfur analysis methods were updated to correspond to NSPS Subpart GG as revised July 2004.

Response: The Air District reviewed the proposed requirements for sulfur monitoring in the draft permit in light of these comments, and has concluded that they are adequate to ensure compliance as originally proposed. The sulfur monitoring condition allows the facility to use PG&E data only if the facility can demonstrate that the data is representative. PG&E data will not be acceptable if it is not accurate. Moreover, "representative" has a well-understood meaning and does not need "objective criteria" to define it further. In plain English, this proposed condition would require that the PG&E data provide a true and accurate picture of the actual sulfur content of the natural gas to be acceptable. With respect to the information about the ASTM fuel sulfur analysis methods, the Air District acknowledges the information but does not find anything in the comment suggesting that the permit conditions need to be changed. The condition requires accurate testing of the sulfur content of the natural gas, and the fact that testing standards may have been revised is not inconsistent with this requirement. The Air District published this additional justification and rationale in the Additional Statement of Basis,

but did not receive any further comments from any member of the public on this issue during the second comment period.

Comment XII.3. – Parametric Particulate Matter Monitoring:

The Air District also received comments stating that it should require more stringent monitoring for PM emissions. The comments claimed that PM emissions are monitored only using heat input, coupled with an emission factor generated from one annual source test. The comments claimed that this information will not accurately predict the PM emissions resulting from this facility. The comments claimed that PM emissions can increase from poor air/fuel mixing or maintenance problems.

Response: The Air District reviewed this issue as well in light of these comments, and it disagrees that annual compliance testing for particulate matter emissions is inappropriate. A primary factor influencing PM emissions is sulfur content in the natural gas, which will be monitored on a monthly basis. To the extent that poor air/fuel mixing or similar combustion problems (whether related to maintenance problems or otherwise) might also increase PM emissions, those conditions would also be manifested in higher Carbon Monoxide emissions. Carbon Monoxide emissions are monitored on a continuous basis, and so any such combustion problems would be detected and addressed immediately. The Air District does not find that it would be necessary to add more frequent PM monitoring as well to address these concerns. The Air District published this additional justification and rationale in the Additional Statement of Basis, but did not receive any further comments from any member of the public on this issue during the second comment period.

XIII. PSD AIR QUALITY IMPACT ANALYSIS ISSUES

The Air District received a number of comments on its Air Quality Impact Analysis, including its modeling analysis showing that emissions from the Russell City Energy Center will not have any significant contribution to any exceedance of the NAAQS for any PSD pollutants and its soils and vegetation analysis showing no significant adverse impacts to soils and vegetation. Many of the comments were directed towards PM_{2.5} impacts in particular. In response to some of these comments, the Air District conducted additional review and analysis, which it published in the August 2009 Additional Statement of Basis. The Air District then received further comments during the second comment period. The Air District's responses on these issues are presented in this section.

A. Air Quality Impact Modeling and Analysis Issues Generally

The Air District first addresses comments related to the Air Quality Impact Analysis and modeling in general. Comments relating to PM_{2.5} specifically and to the soils and vegetation and other analyses are addressed in subsequent subsections.

Comment XIII.A.1. – Currentness of Air Quality Impact Analysis Methodology:

The Air District received comments questioning whether its use of EPA's 1990 Draft NSR Workshop Manual as guidance for conducting the Air Quality Impact Analysis was appropriate. The comments noted that the NSR Workshop Manual is not a binding regulation, and suggested that it may have been superseded by more recent EPA regulatory enactments.

Response: Although the NSR Workshop Manual is not binding as the comments correctly point out, it provides a useful framework for conducting an Air Quality Impact Analysis and has been approved by EPA for use in PSD permitting analyses. The Air District therefore uses the NSR Workshop Manual as guidance in situations where there is not any other more authoritative binding guidance that has been provided by EPA. The comments did not point out any specific area where the Air District's reliance on the NSR Workshop Manual was improper, and the District is not aware of any. The Air District explained this situation in the Additional Statement of Basis and invited members of the public to identify any specific areas where using the NSR Workshop Manual as guidance is inappropriate during the second comment period. No commenters identified any such areas. (Indeed, several comments pointed out areas of the NSR Workshop Manual that they contended the Air District must follow.) The Air District has therefore concluded that its use of the NSR Workshop Manual as guidance is appropriate.²⁵⁶

²⁵⁶ Comments also cited a new section of 40 C.F.R. 52.21 that EPA proposed in 2007 – a new subsection (f) – that would have clarified how emissions would be calculated for purposes of PSD increment consumption analyses. The Air District is unaware of any such regulatory changes that have become final, and the comment did not identify any. Moreover, the comment did not identify any area in which the Air District's emissions calculations or increment consumption analysis was defective or should have been done differently than it was. The Air District therefore disagrees with these comments to the extent that they imply that the Air District erred in how it applied the NSR Workshop Manual and the PSD requirements in general.

Comment XIII.A.2. – PM₁₀ Air Quality Impact Analysis:

The Air District received comments during the first comment period stating that it should use the highest modeled PM₁₀ value to compare with the ambient air quality impact significance threshold, not the sixth-highest value as used in the initial Statement of Basis.

Response: EPA’s modeling guidelines for PM₁₀ specify that the sixth-highest modeled value should be used to compare with the significance threshold.²⁵⁷ As 40 C.F.R. Part 51 Appendix W states, “[f]or the 24-hour PM-10 NAAQS (which is a probabilistic standard)—when multiple years are modeled, they collectively represent a single period. Thus, if 5 years of [National Weather Service] data are modeled, then the highest sixth highest concentration for the whole period becomes the design value.” Furthermore, the EPA guideline model AERMOD is hardcoded with an algorithm using the sixth-highest daily concentration; if another approach is to be used, the guideline approach has to be overridden.²⁵⁸ For these reasons, the Air District concludes that the best reading of the EPA guidance on this issue is that it requires the sixth-highest modeled value to be used for the PM₁₀ analysis.

Nevertheless, in response to this comment the Air District evaluated the potential impacts from using the highest modeled value for the PM₁₀ analysis. The Air District found that using the assumption that the cooling tower water could have up to 8,000 ppm (by weight) Total Dissolved Solids (TDS), the highest modeled value would exceed the PM₁₀ significant impacts level of 5 µg/m³. The Air District therefore explored with the applicant whether it could keep TDS levels within a lower limit. The applicant found that it could keep TDS within a limit of 6,200 ppmw, and so the Air District is lowering the TDS limit in the permit to that level. With the TDS limit reduced to 6,200 ppmw, the cooling tower’s PM₁₀ emissions would be reduced accordingly:

TDS:	8,000 ppmw	6,200 ppmw
Hourly PM₁₀	2.83 lbs	2.19 lbs
24-hour PM₁₀	67.9 lbs	52.6 lbs
Annual PM₁₀	12.1	9.4 tons

The AERMOD modeling analysis was then re-run using a new pollutant ID to enable the program to predict the highest-high 24-hour concentration, and with the revised PM₁₀ emissions rate. The analysis showed a highest modeled 24-hour PM₁₀ concentration of 4.9 µg/m³, which is below the significant impact level.²⁵⁹ The Air District published these revised numbers and the

²⁵⁷ *Guideline on Air Quality Models*, 40 C.F.R. Part 51, Appendix W (July 1, 2008), § 7.2.1.1.b., applicable to PSD Air Quality Impact Analyses per 40 C.F.R. § 52.21(l)(1).

²⁵⁸ See Section 3.2.5 Specifying the Pollutant Type of User’s Guide for the AMS/EPA Regulatory Model-AERMOD - EPA-454/B-03-001, September 2004.

²⁵⁹ See Russell City Energy Center Modeling Files; Summary of Air Quality Impact Analysis for PM_{2.5} From the Russell City Energy Center, attached to Memorandum from Glen Long to Weyman Lee, July 27, 2009 (identifying the maximum predicted impact, *i.e.*, “highest first high concentration”, for PM_{2.5} as 4.9 µg/m³).

supporting analysis in the Additional Statement of Basis and received no further comment on this issue. The Air District is therefore finalizing Condition No. 44 in the final permit to reflect this lowered TDS limit, as proposed in the August 2009 Draft Permit.

Comment XIII.A.3. – Use of Existing Monitoring Data To Assess Ambient Air Quality at Project Location:

The Air District received comments stating that it should conduct monitoring at the specific project location, rather than relying existing monitoring data as representative of ambient air quality conditions at the project location.

Response: EPA’s PSD regulations provide that existing monitoring data can be used in the PSD Air Quality Impact Analysis where the permitting agency determines that it is representative of conditions at the project location.²⁶⁰ As explained below in response to Comment XIII.A.4., the Air District has determined that the monitoring data from its Fremont-Chapel Way monitoring station is sufficiently representative of the air quality conditions at the project location for use in the Source Impact Analysis.

Comment XIII.A.4. – Location of Meteorological and Background Air Quality Monitoring Data:

The Air District also received comments questioning the representativeness of the meteorological data and background air quality data that the District used in its analysis. The comments suggested that that meteorological data from Oakland Airport and the background ambient air quality data from the Fremont-Chapel Way Monitoring Station would not be representative of the project location. The comments suggested that data from Oakland or Hunters Point in San Francisco would be more representative of Hayward air quality. The comments also questioned why the District does not maintain a monitoring station in Hayward. Some comments questioned whether the Air District has conducted air monitoring in Hayward over the past 10 years.

Response: The Air District reviewed the meteorological and background air quality data it used in response to this comment, and has concluded that the data is representative of conditions in the vicinity of the project location. For the meteorological data, data from the Automated Surface Observing System (ASOS) at the Oakland International Airport was used. The site is located 20.8 kilometers to the northwest of the RCEC. AERSURFACE (version 08009) was used to determine surface characteristics in accordance with USEPA’s January 2008 “AERMOD Implementation Guide” at both the Oakland Airport and the RCEC project site. The Oakland meteorological surface data (OAK) is representative of conditions at the Russell City Energy Center project site, based upon the requirements for representativeness set forth in the EPA’s Guideline on Air Quality Models.²⁶¹ The Guideline on Air Quality Models states the following

²⁶⁰ See NSR Workshop Manual at p. C.18. (“the applicant may use existing ambient data [where it is] judged by the permitting agency to be representative of the air quality for the area in which the proposed project would construct and operate.”); see also *In re Kawaihae Cogeneration Project*, 7 E.A.D. 107, 128 (EAB 1997); *In re Hibbing Taconite Co.*, 2 E.A.D. 838, 851 (Adm’r 1989).

²⁶¹ See 40 C.F.R. Part 51, Appendix W, Section 8.3 (Meteorological Input Data).

conditions should be considered when determining if weather data is representative: (1) the proximity of the meteorological monitoring site to the area under consideration; (2) the complexity of the terrain; (3) the exposure of the meteorological monitoring site; and (4) the period of time during which data are collected. The Oakland Airport data satisfies all four of these criteria for representativeness and is appropriate for modeling the proposed project. Both the Oakland Airport and the proposed project location are along the East Bay shoreline with similar predominant upwind fetches. The AERSURFACE analysis showed that both sites had similar land use characteristics. Both sites are located on simple terrain in similar proximity to the complex terrain to the east. The Oakland Airport site is a permanent National Weather Service/Federal Aviation Administration weather installation that operates 24 hours per day. The most recent five years of data at the time (2003-2007) were used for this modeling study. Based upon this comparison, the Oakland ASOS data is representative of the proposed project location and meets all USEPA data completeness requirements.

With respect to the ambient air quality data the Air District used from the Fremont-Chapel Way monitoring station, that data is representative of the background air quality at the project location, based upon the criteria EPA has established for assessing representativeness. EPA provides for monitoring data of this type to be used if it is sufficiently representative based on three factors: (i) monitor location, (ii) the quality of the data, and (iii) the currentness of the data.²⁶² The Fremont-Chapel Way data is representative under all three of these criteria. The Fremont-Chapel Way monitoring station is located approximately 18 km southeast of the project in an area within the same air basin and with the same general geography and level of development. In addition, the data from the Fremont-Chapel Way monitoring station is complete and of high quality, and it is current (2006-2008). The Air District has therefore concluded that the Fremont-Chapel Way monitoring data is representative and appropriate for use in assessing the impacts from the proposed facility.²⁶³

The Air District published this further analysis of the representativeness of the background data it used in the Additional Statement of Basis. During the second comment period, the Air District received further comments criticizing the use of the Fremont-Chapel Way monitoring data. The comments stated that the two zip codes near the proposed project location have higher rates of diseases such as heart disease, respiratory disease, heart failure, pulmonary disease, and asthma than the Alameda County average, and that this suggests a higher level of vulnerability to these diseases in these zip codes than in the rest of the county. The Air District disagrees that this situation, to the extent that it exists, means that the Fremont-Chapel Way monitoring data are inappropriate for the project location. The fact that certain areas may contain populations with increased environmental sensitivities is taken into account when the applicable air quality

²⁶² See NSR Workshop Manual, Section III.A., p. C.19.

²⁶³ The Air District also notes that the Fremont-Chapel Way monitoring station is a “population oriented” station, meaning that it was sited at a location that will be determinative of the air pollution levels to which the majority of the population will be exposed. See 2008 Air Monitoring Network Plan, submitted by the Air District to EPA on July 1, 2009, at pp. 5, 32 (available at www.baaqmd.gov/Divisions/Technical-Services/Ambient-Air-Monitoring/~media/35693B885FB249E7996FABE033A3F070.ashx). This fact further underscores the usefulness of using this monitoring site.

standards are established, as the NAAQS have built into them a margin of safety to ensure that they are health-protective for all populations. It does not mean that it is inappropriate to use monitoring data from a representative location that meet EPA's requirements for PSD analyses.

The Air District also received comments during the second comment period stating that the District should use data from Oakland or San Francisco as more representative. The comments justified this suggestion by stating that those locations would be more appropriate because smog comes to Hayward from Oakland and San Francisco and is lesser in Fremont. The Air District disagrees that Oakland or San Francisco would provide a more representative picture of existing pollutant levels at the project site. The Fremont-Chapel Way data is highly representative under EPA's representativeness criteria as discussed above, and these comments do not suggest otherwise or suggest any reason why Oakland or San Francisco data would be more representative under these criteria. Moreover, a brief review of monitoring data from those locations show that they actually record *lower* levels of ambient air pollutant than the Fremont-Chapel Way location, contrary to the assertion in the comments.²⁶⁴ The use of Oakland or San Francisco background data would therefore be *less* conservative, and the Air District declines the commenters' invitation to do so.²⁶⁵

Finally, in response to the comments suggesting that the Air District should establish a monitoring station in Hayward, the Air District notes that maintaining a monitoring station is an expensive endeavor, and given the District's resource constraints it can only maintain a certain number throughout the entire Bay Area. The Air District maintains several monitoring sites in the East Bay, which provide a good understanding of air quality conditions in the area given the District's resource constraints. The Air District will consider the needs for a monitoring station in Hayward, and in all other relevant areas in the East Bay and larger Bay Area, in its future planning for maintaining a representative monitoring network that will give an accurate picture of ambient air quality conditions.

Comment XIII.A.5. – Accuracy of Emissions Data and Modeling Results:

The Air District received several comments objecting to the emissions data that the Air District used as inputs for its modeling analysis. Comments claimed that the data used in the modeling

²⁶⁴ See Glen Long 10/7/09 email, comparing PM_{2.5} (24-hour) at San Francisco-Arkansas Street and Fremont, showing Fremont at 29 µg/m³ background level and San Francisco at a 26 µg/m³ background level. The Air District also notes that the Fremont-Chapel Way location was chosen as a monitoring site specifically because it is downwind of sources of air pollution and therefore is a more conservative location to use as a measurement of background air pollution concentrations. (See 2008 Air Monitoring Network Plan, submitted by the Air District to EPA on July 1, 2009, at p. 31 (available at www.baaqmd.gov/Divisions/Technical-Services/Ambient-Air-Monitoring/~media/35693B885FB249E7996FABE033A3F070.ashx.)

²⁶⁵ The Air District also notes that the San Francisco Hunters Point monitoring station referenced in some of the comments was operational only for a one year period, from June 2004 through June 2005, and thus is lacking sufficient data to be considered representative. The closest currently-operational District monitoring station to Hunters Point is the Arkansas Street monitoring station, but as discussed herein the Air District disagrees that it would be more representative.

came from the applicant's operation of other power plants and could be subject to potential bias or inaccuracy. Comments also questioned the statistical limits of confidence associated with the modeling results and suggested that the modeling results may not be accurate for these reasons. Comments noted that conditions in the Bay Area vary widely from day to day, with times of heavy fog and cloud ceiling and other times of very hot and still weather, for example. These comments suggested that the modeling may not take such variables into account. Some comments also stated that the Source Impact Analysis improperly assumes that the facility will be operating 24 hours per day, whereas in fact it may shut down and restart on some days and will not necessarily operate for the full 24 hours on any particular day. These comments stated that the modeling should include all emissions that could occur during actual operation, including startup and shutdown emissions.

Response: The Air District based the emissions data that it used as inputs for its modeling analysis on the maximum emission rates that will be allowed for this facility based on the legally enforceable permit conditions that the Air District is imposing. The Air District disagrees with the comments that this approach was inappropriate or that it fails to recognize the actual emissions from this facility. The Air District also disagrees that the modeling program it used is not sufficiently accurate. The Air District used the AERMOD modeling program, which is approved by EPA and represents the state-of-the-art methodology for assessing ambient air impacts from emission sources. This modeling program does take weather conditions into account, and includes meteorological data from a monitoring station in the vicinity of the project site. With respect to basing the modeling on an assumption that the source will be operated 24 hours a day, the Air District based its emissions inputs on the maximum emissions that will be allowed per day.²⁶⁶ These limits will be the applicable limits for the facility regardless of how it operates. If the facility has increased emissions during part of the day from startups and shutdowns, it will have to reduce operations during other parts of the day to ensure that emissions stay within the daily limit. For all of these reasons, the Air District therefore disagrees with the comments that the emissions inputs it used in its modeling were inappropriate.²⁶⁷

Comment XIII.A.6. – Designation of Project Location as “Rural” for AERMOD Modeling:

The Air District received comments questioning whether the site location should have been designated as “rural” for the purposes of the AERMOD air quality impact modeling, given the

²⁶⁶ See Summary of Air Quality Impact Analysis for The Russell City Energy Center Memorandum, attached to Memorandum from Glen Long to Weyman Lee, November 6, 2008, subject: Russell City Energy Center, Permit Application # 15487, (hereinafter, “2008 AQIA Summary”), p. 2.

²⁶⁷ In addition, the applicant stated that the facility will be operated only when dispatched pursuant to the terms of a power purchase agreement with PG&E. The applicant stated that the description of the facility's operation as meeting “spot sale demand” in the Statement of Basis was not entirely correct, because it will be dispatched only pursuant to the power purchase agreement. The Air District acknowledges this comment, but notes that the terms used to describe the operating scenario do not alter the PSD permitting analysis. It is the project's emissions, not the words used to describe the operating scenario, that govern the permitting analysis.

development to the east of the project site. In this context, the commenters alluded to the fact that some areas near the project may be zoned for and used as urban, industrial land.

Response: The “Rural” designation for purposes of AERMOD modeling is simply a variable that is used as an input in the model. It reflects the fact that the level of development in the project area is not of the intensity where increased surface heating due to the urban heat island effect would be expected. This designation is a ‘term of art’ based on an Auer land use analysis.²⁶⁸ The Air District’s selection of the “Rural” designation for purposes of AERMOD modeling does not mean that the District considers the entire area to be rural in character. The Air District agrees with the comments that areas in the project vicinity are light industrial in nature, but would like to clarify for the record that this does not mean that running the AERMOD model with a “rural” setting is inappropriate. To the contrary, the “rural” designation is appropriate for this facility based on the Auer land use analysis.

The Air District published this further explanation of the “Rural” designation in the Additional Statement of Basis and invited further comment on it. The Air District received further comments stating that it should have used the “multiple urban” option instead because the facility would be located in a metropolitan area governed by different jurisdictions and zoned for light industrial, commercial, and single- and multi-family residential. Other commenters also suggested that the “single urban” option might be appropriate. The District also received comments stating that the “Rural” designation was inappropriate because the official slogan of the City of Hayward is “the Heart of the Bay”.

In response to these further comments, the Air District again reviewed the Auer land use analysis for the project. The Air District examined land uses within 3 kilometers of the project location as directed by EPA’s Guidelines. Based on 2005 Association of Bay Area Governments parcel-level land use data, the land within this area was found to be classified 52% rural and 48% urban, making “Rural” the appropriate designation for the analysis. The “Rural” designation here means that there is not likely to be any significant urban heat island effect in the area in which the facility will be located.²⁶⁹ This is an appropriate assumption here, because the facility will be located near a large body of water (the San Francisco Bay) as well as surface water and marsh lands, and the winds blow predominantly onshore from the west, resulting in little heat island effect. The Air District also notes that the three-kilometer radius used in the Auer land use analysis is the same three-kilometer distance that EPA uses for investigating the impacts of shoreline fumigation from a large body of water. This point further highlights that the marine layer, not the urban heat island, will dominate in the area near the shoreline where the project will be located.

Furthermore, to demonstrate that selection of the “Urban” designation would not result in any significant difference in modeled impacts, the Air District ran the model to evaluate impacts with respect to PM_{2.5} – the PSD pollutant that generated the greatest amount of public comment – using the “Urban” designation. The difference in the modeled PM_{2.5} impact was insignificant, and in any event was actually a *decrease* compared with the “Rural” designation: the modeling showed impacts of 0.53 µg/m³ (annual average) using the “Rural” designation, but only 0.47

²⁶⁸ See Guideline on Air Quality Models, 40 CFR Pt. 51, App. W, § 7.2.3.c. and note 73.

²⁶⁹ See *id.*

$\mu\text{g}/\text{m}^3$ (annual average) using the “Urban” designation.²⁷⁰ But in any event, as explained above, the requirements for conducting the modeling analysis require that the “Rural” option be selected because less than 50% of the area with three kilometers of the project site is industrial, commercial, or residential.²⁷¹

The Air District therefore disagrees with these comments because the Auer land use analysis clearly shows that the “Rural” designation should be used, and additionally because even if an “Urban” designation were appropriate here, there is no indication that it would make any difference in the outcome of the Air Quality Impacts Analysis.²⁷² In addition, the Air District also disagrees with the comment citing Hayward’s official slogan as a reason for using the “Urban” setting. A City’s slogan is not relevant to air quality impact modeling or any other PSD permitting issues.

Comment XIII.A.7. – Use of Data and Modeling Results:

The Air District received comments claiming that the Air Quality Impacts Analysis does not demonstrate how the computer modeling translates to the real world context where impacts would be made. The comments complained that information in the analysis is provided in tables, but only once in graphic form and even then without including a scale or other relevant information. The commenter complained that the assumptions made regarding the choice of models and the interpretation of data is not discussed.

Response: The Air District used the modeling program required by EPA for PSD permitting analysis. (See EPA’s Guideline on Air Quality Models, 40 C.F.R. Part 51 Appendix W). This modeling program represents the state-of-the-art methodology for determining what the ambient air quality impacts will be from a source of emissions. The results of this analysis were fully explained and clearly presented in the Statement of Basis and Additional Basis and supporting documentation. The Air District disagrees that the use of this modeling program or the discussion of the results was inappropriate or unclear (although the Air District appreciates this comment and will continue to work to ensure that its analyses are as clear and accessible as possible to interested members of the public).

²⁷⁰ See PM_{2.5} Urban Modeling AERMOD Files, G. Darvin, Atmospheric Dynamics. This analysis focused on annual PM_{2.5} impacts because now that the Bay Area is designated as non-attainment for the 24-hour standard, that standard no longer applies for PSD permitting. But even when one considers the 24-hour standard, the difference resulting from using the “Urban” designation would be insignificant. The maximum 24-hour average PM_{2.5} concentration predicted from the proposed facility’s emissions was 4.97 $\mu\text{g}/\text{m}^3$, as opposed to 4.88 $\mu\text{g}/\text{m}^3$ using the “Rural” designation, a difference of less than 2%.

²⁷¹ Regarding the use of the “multiple urban” option, that option is only applicable when modeling sources over larger domains and in different urban areas (e.g. San Francisco vs. Oakland). Because all of the sources that were modeled are located in one area, the “multiple urban” option is not appropriate and the AERMOD model will not allow it to be chosen.

²⁷² The Air District notes that none of the commenters stated that the analysis would reach a different ultimate conclusion if the “Rural” setting were not used, which is consistent with the Air District’s conclusion.

Comment XIII.A.8. – Completeness of Information Presented in Analysis:

The Air District received comments regarding the December 2008 Statement of Basis suggesting that the Air Quality Impact Analysis's Table II (which presents emissions rates used for modeling for different pollutants and averaging times) and Table III (which presents the maximum predicted ambient air quality impacts that would result from the project) are incomplete.

Response: The Air District reexamined these tables in response to these comments and did not find that they were incomplete in any way. Certain boxes in these tables do not have data in them, but that is because they are not applicable, not because the information is incomplete. For example, in Table II, there are no emission rates provided for NO₂ and CO for the cooling tower because the cooling tower is not a source of emissions of these pollutants. To give another example, short-term emission rates are not provided for NO₂ because the NO₂ standard is an annual standard. The Air District did not put data in these boxes because it was not relevant to the PSD Air Quality Impact Analysis. The Air District explained this situation in the Additional Statement of Basis and invited members of the public to identify any specific areas where they believe data that is relevant and necessary to the Air District's analysis may be missing. The Air District did not receive any further comments in this issue.

Comment XIII.A.9. – Changes Made Since Earlier 2007 Air Quality Impacts Analysis:

The Air District received comments pointing out some changes that the District made in the Air Quality Impact Analysis it issued in connection with its December 2008 Statement of Basis and proposed permit, compared with the analysis issued in connection with the District's 2007 permitting actions. For example, the comments pointed out that the analysis used for the December 2008 Statement of Basis concludes that the maximum one-hour NO₂ impact will be 260 µg/m³, whereas the analysis used for the 2007 permitting actions states that it will be 370 µg/m³.

Response: The modeling for the 2007 permitting actions was performed using the model ISCST. EPA has made that model a non-guideline model, and it has been replaced with AERMOD, the current EPA guideline model. The analysis used for the December 2008 Statement of Basis was performed using AERMOD, and represents the current best assessment of what project impacts will be. As the commenter noted, the maximum one-hour NO₂ impact will be 260 µg/m³.²⁷³ The Air District published this explanation in the August 2009 Additional Statement of Basis and received no further comment.

Comment XIII.A.10. – Shoreline Fumigation Analysis for Startup Emissions:

The Air District received comments questioning whether the impact of startup emissions was taken into account in the Air District evaluation of shoreline fumigation issues.

Response: Fumigation occurs when a plume that was originally emitted into a stable layer is mixed rapidly to ground level when unstable air below reaches plume level. Shoreline fumigation can occur for sources located within 3 km of a large body of water, such as this

²⁷³ 2008 AQIA Summary, *supra* note 266, at p. 6, Table VI (reporting maximum combined impact plus maximum background).

facility which will be located near the San Francisco Bay. In response to these comments, the Air District ran a further shoreline fumigation analysis assuming maximum startup emissions for carbon monoxide. (For NO₂, the NAAQS is an annual standard and so the annual emissions rate, which takes into account startup emissions, is used in the shoreline fumigation analysis. For particulate matter, there is no difference in the emissions limits for startups and other operations and so the analysis for steady-state operations is the same for startups. For these reasons, carbon monoxide is the only pollutant for which it is necessary to conduct a shoreline fumigation analysis specific to startup emissions.) The analysis showed that even with higher emissions expected during startups, the impacts would still be below the PSD Significant Impact Levels used for screening purposes. The Air District has concluded that even in startup mode, the facility's emissions will not cause or contribute to any violation of the NAAQS or increment.²⁷⁴ The results of the modeling analysis are summarized in Table 6 below.

Table 6: Russell City Energy Center – Maximum Ambient Air Quality Impact for Carbon Monoxide for Shoreline Fumigation

Averaging time	Shoreline Fumigation Impact	Significant Impact Level
1-hour	177.8	2000
8-hour	327.5	500

B. Air Quality Impact Modeling and Analysis Issues Related to PM_{2.5}

As discussed above in Section VI (regarding Particulate Matter), the PSD regulatory requirements for PM_{2.5} permitting have been evolving during the course of this permit proceeding. At the time the Air District published its initial proposal in December of 2008, EPA required that its “surrogate policy” be used and that an analysis of PM₁₀ impacts should be used to address PM_{2.5} issues. EPA subsequently stayed that requirement and proposed to repeal it, and so the Air District determined that reliance on the surrogate policy was not appropriate and that an analysis of PM_{2.5} specifically was required. The District therefore completed an Air Quality Impact Analysis for PM_{2.5} impacts, which it published in connection with the August 2009 Additional Statement of Basis.²⁷⁵ At that time, the San Francisco Bay Area was still designated as “attainment/unclassifiable” for PM_{2.5} for both the 24-hour and annual standards, and so the Air District evaluated the facility’s impacts with respect to both standards in the Air Quality Impact Analysis. The analysis found that the facility would not cause or contribute to an exceedance of either standard. (See Additional Statement of Basis at pp. 84-92.) Subsequently, the Bay Area’s redesignation as non-attainment for the 24-hour NAAQS became effective, making PM_{2.5} subject to Non-Attainment NSR requirements and making PSD requirements inapplicable for this pollutant (for the 24-hour standard, at least). As explained in detail in

²⁷⁴ See G. Long, Memorandum regarding Shoreline Fumigation, attached with email from G. Long to A. Crockett, Dec. 10, 2009.

²⁷⁵ Several comments criticized the District’s initial reliance on its PM₁₀ analysis as a surrogate for analyzing PM_{2.5} impacts, in accordance with EPA’s surrogacy policy. When EPA reversed its position on that policy, the Air District agreed with these comments and undertook the PM_{2.5} analysis. The PM_{2.5} analysis is the Air District’s response to these comments.

Section VI, the Air District is conservatively treating this “split” designation as meaning that the facility is subject to Non-Attainment NSR permitting for the 24-hour standard (to the extent applicable), but remains subject to PSD permitting requirements for the annual standard. The Air District addressed the applicable BACT requirements for PM_{2.5} in Section VI, and addresses the Air Quality Impact Analysis requirements here.

As explained in the Additional Statement of Basis, the Air District has examined the potential impacts of the facility’s emissions on ambient PM_{2.5} concentrations, and has found that the facility will not cause or contribute to an exceedance of the annual PM_{2.5} NAAQS. The Air District received comments on this conclusion and the underlying analysis, and responds to these comments below. The Air District also received comments on the analysis it published concluding that the facility’s emissions will not cause or contribute to an exceedance of the 24-hour NAAQS, but now that the Bay Area is designated Non-Attainment that analysis is not part of the PSD permitting analysis. As a result, these comments are no longer relevant to the District’s decision on whether to issue the permit, and the District is not required to respond to them here. Nevertheless, since the Air District has considered the comments and has found that they do not change the outcome of the analysis, the District is publishing responses to them in this document. The Air District stresses that these issues with respect to the 24-hour standard are not a part of the PSD permit, but the District is addressing them anyway because they have been the subject of public interest.²⁷⁶

Before turning to the specific comments, the Air District summarizes the PM_{2.5} Source Impact Analysis it undertook in connection with the August 2009 Additional Statement of Basis. The analysis was based on work submitted by the project applicant in consultation with Air District staff,²⁷⁷ and the District reviewed and documented the results of that work.²⁷⁸ As described in the Additional Statement of Basis (*see* pp. 84-89) and in the Air District’s and applicant’s reports, the Air District applied the two-step methodology set forth in the NSR Workshop Manual. (*See* NSR Workshop Manual, Chapter C.) The first step of the analysis is the “preliminary analysis”, in which the facility’s PM_{2.5} emissions are modeled and their impacts on ambient PM_{2.5} concentrations are compared with a “Significant Impact Level” (“SIL”). A SIL is a screening level used to determine whether a full impact analysis is required; for projects that have no modeled impacts above the SIL, the analysis ends.²⁷⁹ EPA has not finalized SILs for PM_{2.5} yet, and so the Air District applied SILs derived from EPA’s SIL for PM₁₀. The Air District used SILs of 1.2 µg/m³ for 24-hour average PM_{2.5} concentrations and 0.3 µg/m³ for

²⁷⁶ The District also notes that to the extent that in the unlikely event that EPA’s 24-hour PM_{2.5} Non-Attainment designation is stayed, rescinded, or otherwise rendered inapplicable, the District’s responses will also serve as a basis for showing that the facility’s emissions will not cause or contribute to a violation of the 24-hour NAAQS.

²⁷⁷ *See* Atmospheric Dynamics, Inc., *PM_{2.5} PSD Source Impact Analysis for the Russell City Energy Center Draft Prevention of Significant Deterioration (PSD) Permit* (June 2009), revised July 30, 2009 (hereinafter, “PM_{2.5} PSD Source Impact Analysis”).

²⁷⁸ *See* Summary of Air Quality Impact Analysis for PM_{2.5} From the Russell City Energy Center, attached to Memorandum from Glen Long to Weyman Lee, July 27, 2009 (hereinafter, “PM_{2.5} AQIA Summary”).

²⁷⁹ *See* NSR Workshop Manual, pp. C.24-C.25.

annual average PM_{2.5} concentrations.²⁸⁰ These levels are 3¹/₃% and 2% of the respective PM_{2.5} NAAQS for the 24-hour and annual NAAQS, which is the same percentage that EPA uses for the PM₁₀ SILs. Since these percentages are appropriate for PM₁₀, the Air District has concluded that they are appropriate percentages to base a SIL on for PM_{2.5}, a similar pollutant. These are also the most conservative of the three approaches that EPA has proposed in its current SIL rulemaking proposal. Applying these SILs, the Air District determined that the facility would cause impacts above the SIL at several locations. Under the two-step methodology prescribed by the NSR Workshop Manual, when impacts are above the SIL the analysis must proceed to the second step, the “full impact analysis”.

To conduct the full impact analysis, the Air District identified an “impact area” for further analysis, which is a circular area around the facility location with a radius out to the farthest point at which an impact was modeled above a SIL. The farthest location with an impact above any SIL was located 8.1 km from the facility, at which there was a modeled impact above the 24-hour SIL of 1.2 µg/m³. In accordance with EPA policy, the Air District then established a circular “impact area” with a radius of 8.1 km around the facility location in order to conduct a full impact analysis.²⁸¹ The Air District then considered the cumulative impact of the facility’s emissions, background ambient air concentrations, and emissions from other nearby sources on receptors located within this impact area. The facility’s contribution was based on modeling using the facility’s emissions, and the background contribution was based on the Fremont-Chapel Way monitoring data as discussed above. For the contribution from other nearby sources, the Air District undertook a search of its database of PM_{2.5} sources within a radius of 6 miles (9.7 km) around the facility location that have been permitted since January 1, 2007, and located a total of 29 such sources (including 21 backup diesel generators). The Air District also evaluated non-point sources within this area that could cause a significant concentration gradient at any of the areas where the facility’s impact was above the SIL. The Air District identified a portion of Highway 92 that is located approximately 1 km south of the facility as such a non-point source, and included it in the analysis. The cumulative impact from all of these contributions (the facility, the 29 point sources, and Highway 92) was then modeled for each receptor location within the impact area where the facility’s impact was above the SIL.

²⁸⁰ The Air District compared both the 24-hour and annual impacts with their respective SILs, even though the facility is now subject only to PSD requirements for the annual standard, because at the time the Bay Area was still designated as attainment/unclassifiable for the 24-hour standard.

²⁸¹ In accordance with EPA policy, the Air District established the impact area based on the farthest exceedance of either SIL. Now that PSD is no longer applicable for the 24-hour standard, the analysis for the annual standard would need to look only at the farthest exceedance of the annual standard, which was closer than 8.1 km. The most distant impact above the annual SIL was at only 450 meters. The impact area for the annual SIL is therefore only 63.6 hectares in size, whereas the Air District considered the larger impact area of 20,612 hectares based on the 24-hour standard. Rather than redo the analysis with this smaller area, the Air District continued to rely on the larger impact area since even using that larger area the analysis shows no significant contribution to any NAAQS exceedance. The Air District considers the use of this larger area – over 300 times larger in size than the impact area that would result from using the annual SIL – to add a high degree of conservatism to its analysis.

Based on this cumulative analysis, the District evaluated whether the highest 98th percentile (highest 8th high) PM_{2.5} ambient air concentrations would be above the NAAQS at any receptor location. This analysis found that the maximum total combined annual-average ambient air concentration that would occur at any location would be 10.56 µg/m³, which is well below the annual NAAQS standard of 15 µg/m³. The proposed project therefore satisfies the Section 52.21(k) NAAQS compliance requirements for the annual PM_{2.5} standard. The facility will not cause or contribute to a violation of the annual PM_{2.5} NAAQS.

As noted above, the District's analysis also evaluated 24-hour impacts, even though 24-hour impacts are no longer part of the PSD analysis. The District summarizes the results here as well for purposes of providing the public with additional information, since several commenters discussed the results in their comments. As with the annual analysis, the 24-hour analysis evaluated whether the highest 98th percentile (highest 8th high) PM_{2.5} ambient air concentrations would be above the NAAQS at any receptor location where the project's contribution would be above the 1.2 µg/m³ SIL.²⁸² This evaluation examined whether the modeled concentration from the proposed facility plus other modeled sources would be above 6.0 µg/m³ at any such receptor location, because the background level is 29.0 µg/m³, meaning a further increase above 6.0 µg/m³ would exceed the 24-hour NAAQS of 35 µg/m³. The analysis concluded that there would not be any locations where both the project's contribution would be above 1.2 µg/m³ and the total contribution from the project plus the other modeled sources would be above 6.0 µg/m³. The analysis did find some locations where the total contribution from all modeled sources was over 6.0 µg/m³. For example, the highest 98th percentile modeled concentration from these sources was 11.27 µg/m³. But in each of these situations, the project's contribution at that location was well below the SIL, meaning that the project would not be causing or contributing to any NAAQS violation within the meaning of Section 52.21(k).²⁸³ Similarly, the analysis found some locations where the project's contribution was above the SIL, but in each of these situations the total contribution from all modeled sources was below 6.0 µg/m³. This situation arises from the fact that when the wind is from the northwest, the project's impacts can sometimes exceed the SILs, but at those times the wind is blowing the contributions from other sources (such as Highway 92) in the other direction and not causing an exceedance of the NAAQS. Similarly, when the wind is blowing from the Southeast, emissions from sources like Highway 92 can cause exceedances of the NAAQS within the impact area, but at those times the wind is blowing the project's contribution the other way such that the project's emissions are below the SIL. Thus, even if the 24-hour standard were still applicable as part of the PSD permit analysis – which it is not anymore – the District would conclude that the project satisfies the Section 52.21(k) NAAQS compliance requirements for the 24-hour PM_{2.5} standard.

The Air District also addressed PSD increment exceedance in the Additional Statement of Basis. The Air District determined that the project cannot cause an exceedance of a PSD increment for

²⁸² EPA guidance requires the highest 98th percentile value is used because compliance with the NAAQS is determined on this basis. See Appendix W, Section 10.1.c.

²⁸³ See NSR Workshop Manual at p. C.52 (“The source will not be considered to cause or contribute to the violation if its own impact is not significant at any violating receptor at the time of each predicted violation.”).

PM_{2.5} because EPA has not established any PM_{2.5} increments yet. EPA has proposed increments, however, and so the District also examined whether the facility would exceed any of the proposed increments if they had been finalized. EPA's proposed Class II increments are 9 µg/m³ and 4 µg/m³ for the 24-hour and annual standards, respectively, and the facility's maximum impacts of 4.9 µg/m³ and 0.5 µg/m³, respectively, are well below these levels. Thus even if the proposed increments were in effect today, the facility would not cause any exceedance of them. (Again, the 24-hour standard is no longer applicable for PSD permitting, but the Air District provides the increment consumption discussion as a matter of public information.)

Finally, the Air District also undertook an analysis of the potential for impacts at the Point Reyes National Seashore, a federal Class I area that is located approximately 62 km from the project. The analysis concluded that the project will not have any significant air quality impact on any Class I area.²⁸⁴

The Air District published its analysis in the Additional Statement of Basis and supporting documents, and received a number of comments on these issues during the second comment period.²⁸⁵ The Air District responds to these comments on PM_{2.5} issues in this section. The Air District responds to comments regarding the annual PM_{2.5} standard because it is conservatively assuming that the annual standard is still applicable for PSD permitting under the Bay Area's "split" attainment designation (non-attainment for the 24-hour standard and attainment/unclassifiable for the annual standard). The Air District is also responding to issues raised regarding the 24-hour standard, even though the 24-hour standard is no longer applicable for PSD permitting. Although those issues are no longer relevant to the PSD permit analysis and the comments are therefore not something that the Air District is required to respond to, the District nevertheless is providing responses to provide the public with as much information as possible regarding this project. The Air District appreciates the public's interest and input on these issues, even if they are no longer part of the PSD permitting analysis.

Comment XIII.B.1. – SIL Exceedance and Requirement to Conduct Full Impact Analysis for PM_{2.5}:

During the first comment period, the Air District received a number of comments stating that it should conduct an Air Quality Impact Analysis for PM_{2.5}. Some of the comments noted that the maximum modeled ambient PM_{2.5} impact exceeds at least one of EPA's proposed SIL for PM_{2.5}. The comments claimed that when a SIL is exceeded, a full impacts analysis must be conducted to determine whether the NAAQS may be violated.

Response: After the first comment period, the Air District changed its position and determined that PSD review was required for PM_{2.5} specifically, and that it was no longer appropriate to rely on the surrogate policy. The Air District therefore conducted a PM_{2.5} Source Impact Analysis and found that impacts would be above the lowest of EPA's proposed SILs as noted by the comments, which the Air District agrees is an appropriate number to use to determine

²⁸⁴ See PM_{2.5} AQIA Summary, *supra* note 278, at p. 11.

²⁸⁵ The Air District also published the results of a PM_{2.5} visibility analysis (*see* Additional Statement of Basis at 89 & note 157), but did not receive any further comments on this issue.

significance in this analysis. The Air District therefore conducted a full impacts analysis as outlined above.

Comment XIII.B.2. – Basis for PM_{2.5} “Significant Impact Levels”:

The Air District also received comments stating that EPA has not yet finalized its proposed SILs for PM_{2.5}, and so the District must develop its own SILs if it wants to rely on SILs in the Source Impact Analysis. The comments suggested that in relying on EPA’s lowest proposed SIL, the District has not provided adequate justification for that number. The comments also cited an important appellate opinion involving SILs, *Alabama Power v. Costle*, and stated that this case requires an agency to justify SILs by demonstrating that the burdens of regulation will not yield significant benefits. The comments also criticized EPA’s proposed SILs as not being justified by such a showing. The commenters criticized the proposed SILs as arbitrary and based on “ratios” that are not justified; they claimed that it does not make sense to have a single national SIL that will apply to all areas of the country; they claimed that the air in the San Francisco Bay Area is very close to exceeding the NAAQS and so a small impact can have great significance; and they stated that the proposed SIL that the District used is 13% of EPA’s proposed PSD increment, which they stated was a significant amount of deterioration in an area that is already in violation of the NAAQS.

Response: The Air District disagrees that its use of PM_{2.5} SILs in its Source Impact Analysis for this project is inappropriate. To the contrary, the Air District believes that its analysis represents an appropriate, conservative means of satisfying the requirements of the PSD program in the absence of any final rulemaking from EPA. As the commenter correctly noted, the concept of application of *de minimis* thresholds is clearly rooted in the decision of *Alabama Power Co. v. Costle*, 636 F.2d 323, 360 (D.C. Cir. 1980) and in longstanding EPA policy and practice.²⁸⁶ The use of SILs by state permitting agencies pending finalization of EPA’s SIL rulemaking is also supported by the EPA Response to Comments document cited in these comments, which expressly states that states can develop and apply SILs pending finalization of the rulemaking.²⁸⁷

²⁸⁶ See, e.g., Prevention of Significant Deterioration (PSD) for Particulate Matter Less than 2.5 Micrometers (PM_{2.5}) – Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC); Proposed Rule, 72 Fed. Reg. 54112, at 54138 (September 21, 2007) (hereinafter, “September 21, 2007 Proposed Rule”) (“Based on EPA interpretations and guidance, SILs have also been widely used in the PSD program as a screening tool for determining when a new major source or major modification that wishes to locate in an attainment or unclassifiable area must conduct a more extensive air quality analysis to demonstrate that it will not cause or contribute to a violation of the NAAQS or PSD increment in the attainment or unclassifiable area.”); *In Re Prairie State Generating Company*, supra note 6, slip op. at pp. 137-144 and additional authorities cited therein.

²⁸⁷ See EPA, Office of Air Quality Policy and Standards, Air Quality Policy Division, New Source Review Group, Response to Comments, Implementation of the New Source Review (NSR) Program for Particulate Matter Less Than 2.5 Micrometers in Diameter (PM_{2.5}), March 2008, p. 82. To the extent that the comments on this issue were intended to imply that a state agency has to go through a formal rulemaking process before using a PM_{2.5} SIL, the Air District disagrees. There is nothing in any EPA guidance that would require a formal rulemaking process in order for a state to use a PM_{2.5} SIL.

In short, the Air District believes that under EPA's PSD permitting program it is fully authorized to use SILs in its Source Impact Analysis, and has substantial discretion to do so as it considers in the manner that it considers most appropriate and justified (at least until EPA finalizes its proposed SILs).

Moreover, the Air District disagrees that the $0.3 \mu\text{g}/\text{m}^3$ SIL that it used to evaluate potential impacts on annual $\text{PM}_{2.5}$ concentrations, which corresponds to the lowest and most conservative of EPA's proposed SILs for the annual standard, is not adequately justified. This SIL threshold level was derived using the same *de minimis* percentage of the $\text{PM}_{2.5}$ NAAQS as was used in deriving the SIL for PM_{10} , a similar class of pollutant. For PM_{10} , EPA has determined that an increase in ambient PM_{10} levels of less than 2% of the annual PM_{10} NAAQS can be considered *de minimis* for purposes of the PSD analysis. EPA has therefore established the annual PM_{10} SIL at $1.0 \mu\text{g}/\text{m}^3$, which is 2% of the annual PM_{10} NAAQS ($50 \mu\text{g}/\text{m}^3$).²⁸⁸ Applying this same 2% *de minimis* rationale for the annual $\text{PM}_{2.5}$ NAAQS of $15 \mu\text{g}/\text{m}^3$ results in a significance level of $0.3 \mu\text{g}/\text{m}^3$, which is the SIL that the Air District used in its $\text{PM}_{2.5}$ analysis.²⁸⁹ Since EPA has established by final regulation that it is justifiable to set the *de minimis* SIL level for PM_{10} at 2% of the NAAQS, the Air District has concluded that it is similarly justifiable and appropriate to set the *de minimis* SIL level for $\text{PM}_{2.5}$ at 2% of the NAAQS, at least on an interim basis until EPA can finalize its rulemaking.²⁹⁰

²⁸⁸ See 40 C.F.R. § 51.165(b)(2) ($1.0 \mu\text{g}/\text{m}^3$ SIL for annual PM_{10}). The analysis of 24-hour impacts is no longer required now that the Bay Area has been redesignated as non-attainment, but to the extent that it is still relevant the District notes that the SIL it used for the 24-hour analysis – $1.2 \mu\text{g}/\text{m}^3$ – is valid for the same reasons as the annual SIL. It was based on the same *de minimis* percentage of the NAAQS as EPA used for the 24-hour PM_{10} SIL. The 24-hr PM_{10} SIL is $5.0 \mu\text{g}/\text{m}^3$, which is $3\frac{1}{3}\%$ of the 24-hour PM_{10} NAAQS. (See *id.*) The $1.2 \mu\text{g}/\text{m}^3$ 24-hr $\text{PM}_{2.5}$ SIL the Air District used in its analysis is the same $3\frac{1}{3}\%$ percentage of the 35 ppm 24-hour $\text{PM}_{2.5}$ NAAQS.

²⁸⁹ Further discussion on the how these SILs are justified is contained in EPA's proposed SIL rulemaking, 72 Fed. Reg. at 54140. The Air District has reviewed this rationale and believes that it demonstrates that these SILs are appropriate and justified for use here. The Air District therefore disagrees with the implication that it is blindly following EPA's proposal without any independent review and judgment. To the contrary, the Air District believes in its own independent professional judgment that the proposed SILs are appropriate here for the reasons explained in this Response.

²⁹⁰ The Class I SILs the Air District used were developed in a similar manner, based on the established Class I SILs for PM_{10} . EPA developed a PM_{10} annual Class I SIL of $0.2 \mu\text{g}/\text{m}^3$, which is 0.4% of the annual PM standard of $50 \mu\text{g}/\text{m}^3$. Taking 0.4% of the annual $\text{PM}_{2.5}$ standard ($15 \mu\text{g}/\text{m}^3$) results in an annual $\text{PM}_{2.5}$ Class I SIL of $0.06 \mu\text{g}/\text{m}^3$. Similarly, EPA developed a PM_{10} 24-hour Class I SIL of $0.3 \mu\text{g}/\text{m}^3$, which is 0.2% of the 24-hour PM_{10} standard of $150 \mu\text{g}/\text{m}^3$. Taking 0.2% of the 24-hour $\text{PM}_{2.5}$ standard ($35 \mu\text{g}/\text{m}^3$) results in a 24-hour $\text{PM}_{2.5}$ Class I SIL of $0.07 \mu\text{g}/\text{m}^3$. Additionally, as an alternative way to establish the $\text{PM}_{2.5}$ SILs, the Air District following the approach EPA used when it developed its PM_{10} SILs, which was to set the SILs at 4% of the increment. According to EPA, setting the Class I SILs in this manner was based on its belief that, "where a proposed source contributes less than 4% to the Class I increment, concentrations are sufficiently low so as not to warrant a detailed analysis of the

The Air District also notes that using this approach for establishing SILs for PM_{2.5} is supported by a number of other permitting agencies and similar entities. Besides being proposed by EPA (as the lowest and most conservative of three alternatives being considered by that agency), this rationale has been followed in developing SILs by several other states, the Northeastern States for Coordinated Air Use Management (“NESCAUM”), and the National Association of Clean Air Agencies.²⁹¹ The fact that these other air permitting agencies recommend using this same approach further supports the District’s determination that, in its judgment, a 0.3 µg/m³ SIL is appropriate for the permitting analysis here.²⁹²

combined effects of the proposed source and all other increment-consuming emissions.” (72 Fed. Reg. at 54140.) By calculating the ratio of the PM_{2.5} to PM₁₀ NAAQS for both the annual and 24-hour standards (0.3 and 0.24, respectively) and then applying these ratios to the PM₁₀ increments, long- and short-term Class I PM_{2.5} increments of 1 and 2 µg/m³ were derived, which, upon application of EPA’s recommended 4% factor, results in proposed annual and 24-hour Class I SILs of 0.04 and 0.08 µg/m³ (respectively). This was the approach that EPA used in developing “Option 1” in its proposed PM_{2.5} SIL rulemaking. (See 72 Fed. Reg. at 54140.) Believing that either of these options would provide a sound basis for developing appropriate interim PM_{2.5} SILs – at least until EPA finalizes its PM_{2.5} SIL rulemaking – the Air District then conservatively took the lower result for each of the long- and short-term SILs, which resulted in application of an annual Class I PM_{2.5} SIL of 0.04 µg/m³ and a 24-hour Class I PM_{2.5} SIL of 0.07 µg/m³.

²⁹¹ See, e.g., NESCAUM Technical Guidance on Significant Impact Levels (SILs) for PM_{2.5} Revised NESCAUM Permit Modeling Committee, December 8, 2006; available at: www.nescaum.org/focus-areas/science-and-technology/science-and-technology-documents; CTDEP Interim PM_{2.5} New Source Review Modeling Policy and Procedures, Gina McCarthy, Commissioner, Connecticut Department of Environmental Protection, issued August 21, 2007, restated February 11, 2009 at: www.ct.gov/dep/lib/dep/permits_and_licenses/air_emissions_permits/nsrmodelingplan.pdf; Interim Permitting and Modeling Procedures for Sources Emitting between 10-100 Tons per Year of PM_{2.5} (Fine Particulate) (Revised to include 2008 PM_{2.5} Monitoring Data), State of New Jersey, Department of Environmental Protection, Division of Air Quality, March 17, 2009; available at: www.nj.gov/dep/aqpp/downloads/PM-2.5modelingpolicy_Mar2009.pdf; letter, Northeastern States for Coordinated Air Use Management, to Docket ID No. EPA-HQ-OAR-2006-0605, Re: NESCAUM Comments on EPA’s Proposed Rule: Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers (PM_{2.5})–Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC). 72 Federal Register 54111, September 21, 2007, December 13, 2007; available at: www.nescaum.org/documents/nescaum-comments_psd-increment_sil_smc-20071213-final.pdf/; letter from National Association of Clean Air Agencies to U.S. EPA Air and Radiation Docket, Re: Docket ID: EPA-HQ-OAR-2006-0605, January 17, 2008; available at: www.4cleanair.org/documents/PM25Increments.pdf.

²⁹² Note also that in practice the Air District applied a much higher and more conservative SIL in determining the impact area than was necessary, which resulted in a much larger and more conservative impact area than was necessary. This is because the Air District used the 24-hr SIL of 1.2 µg/m³ to establish the impact area, which resulted in an impact area with a radius of 8.1 km, even though the 24-hr analysis is no longer required for PSD permitting. The Air District

Finally, with respect to the remainder of the criticisms of the SILs the Air District used, these focus primarily on the 24-hour analysis, which is no longer applicable. For example, commenters objected that the 24-hour SIL the Air District used should not be considered a *de minimis* amount because it constitutes 13% of the proposed 24-hour increment, and in the commenters' view any amount above 10% of the total increment should not be *de minimis*. But this argument does not hold for the annual SIL the District used, which is less than the 10% level at which the comments suggested the impact would cease to be *de minimis*.

Similarly, other comments objected to using a *de minimis* SIL analysis in an area that is very close to or already exceeding the NAAQS. But again, this argument applies primarily to the 24-hour PM_{2.5} NAAQS, as the Bay Area has a much greater compliance margin for the annual NAAQS. Moreover, to the extent that the Bay Area's status as being already in violation of the 24-hour NAAQS as a factual matter has until recently created anomalies when applying a PSD analysis to 24-hour PM_{2.5} impacts, this situation was the result of the time lag in EPA's formal legal designation of the Bay Area as non-attainment. This situation meant that until recently the District has been required to apply the PSD rules under 40 C.F.R. section 52.21, when it should appropriately be applying the Non-Attainment NSR rules under Appendix S since the region is not in attainment of the 24-hour standard. To the extent this situation led to anomalies, such as using SILs to demonstrate that a facility would not cause or contribute to a violation of the NAAQS for 24-hour PM_{2.5} in a region that was already in violation of the NAAQS for that pollutant as a factual matter, this situation arose because of the time lag in EPA's designation, not because of any defect in EPA's proposed SILs.

For these reasons, the Air District disagrees with the comments that the SILs it used were inappropriate, unjustified, or arbitrary. The Air District also observes that none of the comments offered any alternative rationale that would be more appropriate in establishing a *de minimis* level of impacts to use as SILs here under the principles expressed in *Alabama Power v. Costle*. The Air District has therefore concluded that its use of SILs in the Source Impact Analysis was appropriate under EPA's PSD regulations, and that it supports the District's determination that the facility will not cause or contribute to a violation of any NAAQS or PSD increment.

Comment XIII.B.3. – Inclusion of Precursors in the PM_{2.5} Analysis:

The Air District also received comments stating that it should take NO_x and ammonia emissions into account in its PM_{2.5} Source Impact Analysis, asserting that these emissions are precursors to secondary PM_{2.5} formation.

With respect to NO_x, the comments stated that the District should include NO_x in its analysis because NO_x is “presumed in” under EPA's PM_{2.5} implementation rule.²⁹³ The comments

was required to use only the annual SIL in this analysis, which is much lower at 0.3 µg/m³ and would have resulted in a much smaller impact area of only 0.45 km in radius. (*See supra* note 281.) This approach resulted in even more conservatism in the analysis.

²⁹³ See 73 Fed. Reg. 28321, 28328 (May 16, 2008). “Presumed in” is EPA shorthand for the agency's treatment of NO_x as presumptively a PM_{2.5} precursor unless it can be demonstrated

claimed that the District was improperly relying on EPA's SIL proposal, which directs agencies to use only direct PM_{2.5} emissions and not precursors in applying the SILs, for not including NOx emissions in its PM_{2.5} calculations (as well as on informal guidance from EPA staff on this issue). The comments also claimed that the preamble for EPA's SIL proposal suggests that NOx emissions should be included in the Source Impact Analysis because language in the preamble stated that EPA evaluated both direct PM_{2.5} emissions and secondary PM_{2.5} resulting from other pollutants such as NOx when it evaluated its proposed increment levels. The commenters stated that because EPA evaluated both direct PM_{2.5} and secondary PM_{2.5} from these precursors when it evaluated its proposed increments, the Source Impact Analysis should take NOx into account when evaluating whether the facility will cause or contribute to a violation of the NAAQS. The comments also stated that air in the Bay Area has more available ammonia than nitric acid (*i.e.*, is "nitric-acid limited"), such that adding additional nitric acid will cause the nitric acid to react with ammonia to form ammonium nitrate, which will add to PM_{2.5} levels. (The comments implied that additional NOx emissions will add to nitric acid in the atmosphere and lead to this reaction.) The comments also stated that there are modeling tools available to undertake an analysis of NOx emissions on secondary PM_{2.5} formation. In this regard, the commenters cited language from EPA's Guideline on Air Quality Models (40 C.F.R. Part 51, Appendix W) discussing regional models, which states that regional models are not designed for evaluating individual sources but notes that such models can be of use in the context of regional transport of secondary particulates. The commenters also cited District Regulation 2-2-303 and stated that the District's willingness to allow inter-pollutant trading between NOx and particulate matter for offset purposes further supports incorporating NOx emissions into the PM_{2.5} Source Impact Analysis as a PM_{2.5} precursor.

With respect to ammonia, comments stated that ammonia emissions would form secondary particulate matter. The comments questioned the Air District's analyses in the Statement of Basis and Additional Statement of Basis finding that ammonia slip from the facility would not contribute to the formation of secondary particulate matter. The comments suggested that the memorandum the District cited in support of its conclusion that the Bay Area is nitric-acid limited – on which the conclusion that ammonia will not cause significant secondary PM_{2.5} formation was in part based – was specific only to the San Jose and Livermore areas and cannot be used to support a determination for the Hayward area. The comments also stated that Air District staff were reevaluating the District's conclusion that ammonia slip emissions do not contribute to secondary particulate formation as expressed in the earlier memorandum. The commenters claimed that the Air District should assess the potential for ammonia slip from this facility to contribute to secondary particulate matter formation.

Response: The Air District disagrees that it is required to include NOx emissions in its PM_{2.5} analysis. Nevertheless, in response to these comments the Air District has undertaken an assessment of precursor emissions on secondary PM_{2.5} formation using a regional transport model and has found that including precursors would not make a significant difference in the results of the analysis. The Air District therefore disagrees with these comments that the potential for precursor emissions to cause secondary PM_{2.5} formation suggests that the District

that NOx emissions are not a significant contributor to the region's ambient PM_{2.5} concentrations.

should revise the analysis's ultimate conclusion: that the facility will not cause or contribute to a violation of the PM_{2.5} NAAQS. The Air District's analysis is set forth in the following discussion:

- *NOx as a Precursor To Secondary PM_{2.5} Formation:*

First, the Air District disagrees with the comments that including NOx emissions in the PM_{2.5} analysis is required under EPA's PSD regulations. EPA has made clear in its SIL rulemaking that it interprets the PM_{2.5} analysis not to include NOx emissions as a precursor, as all of the alternatives it is considering in its rulemaking proposal would include only "direct PM_{2.5} emissions from the new stationary source" in the demonstration that the facility will not cause or contribute to an exceedance of the NAAQS.²⁹⁴

This interpretation is justified because in most cases, the bulk of the PM_{2.5} impacts will occur near the source. As such, there will be minimal time and travel distance between the emissions point and the impact point, giving little time for secondary PM_{2.5} formation to occur.²⁹⁵ This situation is present here, as the bulk of the particulate impacts are just outside of the fence-line of the facility, with the remainder only a few miles away.²⁹⁶

The Air District also notes that current EPA-approved models do not adequately consider the chemistry necessary to account for secondary PM_{2.5} formation from NOx emissions, which is one of the reasons why EPA has interpreted its proposed SILs taking into account direct PM_{2.5} emissions only.²⁹⁷ Currently-approved models are dispersion models which predict how

²⁹⁴ 72 Fed. Reg. at 54149 (proposing 40 C.F.R. 51.166(k)(2)); 72 Fed. Reg. at 54154 (proposing 40 C.F.R. 52.21(k)(2)) (emphasis added).

²⁹⁵ This justification was cited by the Northeastern States for Coordinated Air Use Management (NESCAUM) and by the National Association of Clean Air Agencies as a reason for presumptively excluding NOx emission from the PM_{2.5} impact analysis. See letter, Northeastern States for Coordinated Air Use Management, to Docket ID No. EPA-HQ-OAR-2006-0605, Re: NESCAUM Comments on EPA's Proposed Rule: Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers (PM_{2.5})—Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC). 72 Federal Register 54111, September 21, 2007, December 13, 2007; available at: www.nescaum.org/documents/nescaum-comments_psd-increment_sil_smc-20071213-final.pdf/; letter from National Association of Clean Air Agencies to U.S. EPA Air and Radiation Docket, Re: Docket ID: EPA-HQ-OAR-2006-0605, January 17, 2008; available at: www.4cleanair.org/documents/PM25Increments.pdf. The fact that these associations interpret the PSD source impact analysis to exclude NOx as a precursor to secondary PM_{2.5} formation further supports the Air District's interpretation.

²⁹⁶ See PM_{2.5} AQIA Summary, *supra* note 278, at p. 5; PM_{2.5} PSD Source Impact Analysis, *supra* note 277, at p. 12.

²⁹⁷ See, e.g., Draft Modeling Protocol for PM_{2.5}, Regional/State/Local Modeler's Workshop, Philadelphia, May 2009, slide no. 6; available at: www.cleanairinfo.com/regionalstatelocalmodelingworkshop/archive/2009/presentations/05%20Weds%20PM/2009rsl_Draft%20Modeling%20Protocol%20for%20PM25.pdf; New Source Review: PM_{2.5} NSR Rules, Region 4 Modelers' Conference, March 17, 2009, slide no. 43; available at: www.epa.gov/Region4/air/modeling/2009%20Workshop/March-17-

directly-emitted particulate matter will impact ambient air concentrations; they are not photochemical models that predict how precursors may react with each other in the atmosphere to form secondary particulate matter. Without sufficient tools available to accurately assess the potential for secondary PM_{2.5} formation, the Air District would risk engaging in speculation in trying to quantify what the potential for this effect might be. EPA has made clear PSD permitting decisions should not be based on speculation.²⁹⁸

For all of these reasons, the Air District disagrees that inclusion of NO_x in the air quality impact analysis as a precursor to secondary PM_{2.5} is required for PSD permitting.

- *Ammonia as a Precursor To Secondary PM_{2.5} Formation:*

With respect to ammonia, EPA has established that ammonia is “presumed out” as a PM_{2.5} precursor, and is not included as the PSD analysis. (*See generally*, discussion in Response to Comment No. VI.2. above.) Based on this clear regulatory direction from EPA about what to include in the PSD permitting analysis for PM_{2.5}, the Air District disagrees that it should or could include ammonia in its source impact analysis as a precursor to secondary PM_{2.5} formation.

Moreover, beyond these legal requirements excluding ammonia slip from federal PSD permitting, the Air District has found that the Bay Area – and in particular the area where the facility will be located – is nitric-acid limited and that additional ammonia emissions will therefore not cause significant additional secondary PM_{2.5} formation.²⁹⁹ As discussed in Response to Comment No. VI.2. above, secondary particulate formation mechanisms are highly complex and it is therefore difficult to state with certainty what the conditions in the Bay Area are. But the Air District has used a computer model to simulate how emissions PM_{2.5} precursors will impact regional ambient PM_{2.5} concentrations, which District staff reviewed in response to comments that the 1997 memorandum cited in earlier documents was outdated. The Air District’s draft report on its computer modeling exercise concludes that regional ammonium nitrate buildup is limited by nitric acid, not by ammonia.³⁰⁰ The draft report does find that the amount of available nitric acid is not uniform but varies in different locations around the Bay Area, and consequently the potential for ammonia emissions to impact PM_{2.5} formation varies around the Bay Area. Specifically, according to the draft report, the model predicts that a reduction of 20% in total ammonia emissions throughout the Bay Area would result in changes

09/DeroeckREGION%204%20PRESENTATION%20PM2.5%20NSR%20IMP+%20Increments 17_4.ppt. The Air District received comments critical of looking to informal EPA guidance documents such as these, but the District believes that such informal documents can be useful in arriving at sound permitting decisions. Obviously, this informal guidance is not binding in the way that a regulation would be, but where it provides sound reasoning it can be helpful in interpreting how to apply the PSD requirements appropriately.

²⁹⁸ See, e.g., *In re Three Mountain Power*, 10 E.A.D. 39, 57-58 (EAB 2001).

²⁹⁹ The memorandum at issue is the Sept. 8, 1997, Office Memorandum from D. Fairley to T. Perardi & R. De Mandel entitled “A first look at NO_x/Ammonium nitrate tradeoffs”, discussed on pp. 26-27 of the Statement of Basis and pp. 55-56 of the Additional Statement of Basis.

³⁰⁰ See BAAQMD, Draft Report, *Fine Particulate Matter Data Analysis and Modeling in the Bay Area* (Draft, Oct. 1, 2009), at p. E-3 & p. 30. The Air District anticipates issuing a final report shortly.

in ambient PM_{2.5} levels of between 0% and 4%, depending on the availability of nitric acid, leaving open the potential that ammonia restrictions could form a useful part of a regional strategy to reduce PM_{2.5}.³⁰¹ The draft report therefore restates the general conclusion from the 1997 “first look” memorandum that the Bay Area is nitric-acid limited, although it finds that reductions in the region’s ammonia inventory could potentially achieve reductions in PM_{2.5} concentrations in areas that may have sufficient available nitric acid.³⁰² (The draft report cautions that its assumptions regarding the availability of nitric acid may be misleading, however, because of the preliminary nature of the ammonia emissions inventory used for modeling.) Notably, the model predicts that the Hayward area, like the Livermore and San Jose areas, has among the lowest levels of available nitric acid in the entire region, in the vicinity of 0.25 ppb or less.³⁰³ This last finding suggests that the study from the 1997 “first look” memorandum regarding the Livermore and San Jose areas would be useful in assessing the situation in the Hayward area. Thus, after evaluating this issue further based on all of the evidence before it, the Air District continues to conclude that the evidence at this stage shows that additional ammonia emissions from the Russell City facility will not make a significant additional contribution to secondary PM_{2.5} formation. The Air District therefore disagrees that it should be required to include ammonia in the source impact analysis for this additional reason as well.

- *CMAQ Modeling Of Secondary PM_{2.5} Formation:*

The Air District disagrees with the comments that it was required to include NO_x and/or ammonia as precursors in its PM_{2.5} analysis for the reasons discussed above. Nevertheless, the Air District understands the concern underlying these comments and the importance of PM_{2.5} issues, and so it explored the commenters’ suggestion to use a regional transport model as a simple way of generating a rough estimate of what the additional impact of precursor emissions might be. Per the comments’ suggestion, the Air District used the Community Multiscale Air Quality (CMAQ) model to estimate the secondary PM_{2.5} impacts from the proposed project’s emissions of all PM_{2.5} precursors, including NO_x and ammonia. The CMAQ model is a photochemical grid model with state-of-the-art-science capabilities for modeling multiple pollutants including fine particles. It is different in this respect than the dispersion models normally used for assessing particulate matter impacts, which allows it to address secondary PM_{2.5}. This type of model is a regional model and it is not intended for modeling the impacts associated with individual facilities, and it has not been approved by EPA for this purpose. But the Air District used this model in an attempt to assess the impacts from all PM_{2.5} precursors that will be emitted by the Russell City facility.

The Air District chose a particular period for analysis when the Bay Area experienced an historically high PM_{2.5} event between December 2, 2006 and February 2, 2007. The CMAQ model was run for this base case period, once without the proposed project’s emissions and then again, adding the proposed facility’s emissions of NO_x, reactive organic compounds (ROG), sulfur dioxide (SO₂), and ammonia (NH₃). To reflect the potential “6x16” operating profile of the proposed facility (six days a week, sixteen hours a day at baseload), it was assumed that the

³⁰¹ See *id.* at pp. E-3 – E.4.

³⁰² See *id.* at p. 30.

³⁰³ See *id.*, Figure 17, p. 31.

proposed facility did not operate on Sundays. The model was run for the entire 63-day period.³⁰⁴ Daily average surface concentrations of PM_{2.5} were computed for each of the 185 x 185 surface grid cells for each run. The cell-by-cell concentration differences (deltas) were then calculated.

The greatest difference in modeled concentrations between the scenarios with and without the proposed facility's emissions of precursors occurred in the grid cell in which the proposed facility is located. The difference in 24-hour concentration in that grid cell is 0.11 µg/m³.³⁰⁵ Assuming that this 24-hour difference extended over the course of a full year (a highly conservative assumption), the facility would still not cause or contribute to an exceedance of the annual PM_{2.5} NAAQS. As described in the Additional Statement of Basis, the maximum impact from direct PM_{2.5} (including background and other nearby sources) was found to be 10.56 µg/m³. Even assuming an additional impact of 0.11 µg/m³ from secondary PM_{2.5} formation, that would still make a total impact of only 10.67 µg/m³, which is still well below the annual NAAQS of 15 µg/m³.³⁰⁶ (Note that the 24-hour standard is no longer applicable for PSD purposes, now that the region has been designated as non-attainment for that standard. But even if it were still applicable, a 0.11 µg/m³ additional impact from secondary particulate formation would not cause or contribute to any modeled violation of the standard. The Air District and applicant have confirmed that, adding the maximum secondary particulate impacts (0.11 µg/m³) would not result in the exceedance or violation of any PM_{2.5} significance level or standard at any point where the facility's impact would be above the SIL.) Based on this computer modeling, the Air District continues to conclude, based on the best available information, that the facility would not have any significant secondary PM_{2.5} impacts and would not cause or contribute to a violation of the PM_{2.5} NAAQS, even if precursors had to be included in the PSD source impact analysis.

³⁰⁴ Selection of a discrete period of historic maximum PM_{2.5} concentrations for purposes of the NAAQS compliance demonstration is consistent with EPA guidance on application of more sophisticated regional models. (*See, e.g.*, Guideline on Air Quality Models, 40 C.F.R. Part 51, App. W, § 5.2.2.1 (“Control agencies with jurisdiction over areas with secondary PM-2.5 problems are encouraged to use models which integrate chemical and physical processes important to the formation, decay and transport of these species (*e.g.*, Models-3/CMAQ or REMSAD) Suitability of a modeling approach or mix of modeling approaches for a given application requires technical judgment, as well as professional experience in choice of models, use of the model(s) in an attainment test, development of emissions and meteorological inputs to the model and selection of days to model.”) (internal references omitted).)

³⁰⁵ *See* D. Fairley, Memorandum, “Analysis of CMAQ Modeling of Russell City Secondary PM_{2.5}”, attached with email message from D. Fairley to W. Lee, July 9, 2009. This modeling took into account all potential PM_{2.5} precursors, including NOx, ammonia, ROG, and SO₂.

³⁰⁶ Notably, the impact of NOx, the only “presumed-in” precursor that the facility will emit in amounts over the PSD significance level, was actually *negative*. That is, the CMAQ model predicts that the facility's NOx emissions will actually result in slight *decreases* of secondary PM_{2.5} levels. (*See* D. Fairley, Memorandum, “Russell City CMAQ Model Results Without Ammonia”, attached with email message from D. Fairley to B. Bateman & W. Lee, July 9, 2009.) This result may not correspond to actual dynamics, however, as another approach showed a very slight – and not significant – increase in secondary PM_{2.5} from the increase in NOx. (*See id.*)

Comment XIII.B.4. – Selection of Nearby Point Sources For Full Impact Analysis:

The Air District also received comments criticizing its analysis of other nearby sources in the PM_{2.5} Source Impact Analysis. Specifically, these comments criticized the District's analysis of 29 nearby sources that have been permitted by the District since January 2007, which the District analyzed because they may not be adequately represented in the background PM_{2.5} monitoring data. The comments cited EPA guidance that the multi-source modeling must include all nearby point sources that could cause a significant concentration gradient within the proposed source's impact area, and stated that the District has not adequately justified why the 29 sources it included in its modeling represent all such nearby sources. The comments noted that EPA's guidance states that sources as distant as 50 km from the proposed facility should be modeled if they would cause a significant concentration gradient within the impact area, and stated that there are many sources within a 50 km radius that could potentially do so. Some comments claimed that the District should include all emission sources located anywhere within 50 km in its full impact analysis. Other comments stated that the District should explain how it determined that the 29 sources it modeled were the appropriate nearby sources for purposes of the Source Impact Analysis. The commenters also pointed out that these sources should be modeled at their maximum allowable emissions rates.

Response: The Air District disagrees with these comments and believes that it correctly included appropriate nearby sources in its analysis consistent with EPA guidance. According to EPA guidance, the selection of nearby sources should be based on an "impact area" defined by drawing a circle around the site with a radius equal to the distance to the farthest location where an exceedance of the SIL is modeled to occur.³⁰⁷ The farthest location where the modeling showed an impact above the annual SIL of 0.3 µg/m³ was 450 meters (0.28 mi) from the project location.³⁰⁸ The Air District then looked at all recently-permitted sources within six miles of the project location to see if there were any recently-permitted sources that may not be reflected in the background concentrations the Air District used based on ambient air monitoring data. This survey out to six miles went nearly 20 times farther out than the edge of the impact area. The Air District believes that this is a highly conservative approach to canvassing sources.

The Air District notes that the guidance requires including only sources that are "expected to cause a significant concentration gradient in the vicinity of" the source being reviewed.³⁰⁹ For PSD purposes, "vicinity" is defined as the impact area, although the location of nearby sources could be anywhere out to 50 km.³¹⁰ The Source Impact Analysis must therefore examine the

³⁰⁷ NSR Workshop Manual at pp. C.26, C.31.

³⁰⁸ See PM_{2.5} PSD Source Impact Analysis, *supra* note 277, at pp. 11-12. As explained above, in the August 2009 analysis the Air District identified the "impact area" based on impacts above the 24-hour SIL because the Bay Area was still designated as attainment/unclassifiable for the 24-hour standard and thus PSD still applied for that standard. The resulting impact area based on the 24-hour SIL was 8.1 kilometers in radius. Now that the Bay Area has been designated as non-attainment for the 24-hour standard, that standard is no longer applicable for PSD purposes and the impact area is defined by the annual standard only (to the extent that PSD is even applicable where there is a "split" attainment designation).

³⁰⁹ 40 C.F.R. Pt. 51, App. W, § 8.2.3.b; NSR Workshop Manual at C.32.

³¹⁰ NSR Workshop Manual at p. C.32.

combined impacts of the source under review plus other sources within 50 km that will be expected to cause a significant concentration gradient with the impact area. Furthermore, the Guideline on Air Quality Models requires that the analysis focus on locations where the source's emissions will interact with the emissions from the other nearby sources.³¹¹ The Air District disagrees that its approach of looking out as far as 6 miles away from the facility location was inappropriate under this guidance. Given the likely falloff of ambient concentrations the farther one moves from the source, the Air District finds it highly unlikely that there would be additional sources beyond six miles that could cause a significant concentration gradient within the impact area.³¹² Indeed, the Air District considers it unlikely even that most of the sources it found within the 6-mile radius would be likely to cause a significant concentration gradient inside the impact area, but it nevertheless included them all to be conservative as well as for convenience.³¹³ The Air District concluded that this approach was conservative and justifiable under EPA guidance to ensure that it identified and included all appropriate nearby point sources.³¹⁴

The Air District established this 6-mile search area based on its professional engineering judgment, and continues to believe that the approach is justified. Emphasizing that “[t]he

³¹¹ 40 C.F.R. Pt. 51, App. W, § 8.2.3.e. (“The impact of nearby sources should be examined at locations where interactions between the plume of the point source under consideration and those of nearby sources (plus natural background) can occur.”)

³¹² For an idea of how PM_{2.5} levels tend to fall off with distance from an emissions source, see the applicant's sensitivity analysis for Highway 92, which measured ambient PM_{2.5} concentrations as a function of distance from the highway, and found an exponential falloff in concentrations the farther one moves from the PM_{2.5} source. (See Source Impact Analysis, p. 13, Figure 2, “PM_{2.5} Sensitivity Analysis, Impact vs. Distance from Road for Middle Route 92 Segment”.)

³¹³ It was easier to be overly conservative and just include all of these 29 sources in the full impact analysis, rather than having to evaluate the impacts that each one would have individually inside the impact area to determine if it would cause a significant concentration gradient. The Air District also notes that it did, in fact, model all of these sources at their maximum permitted emissions rates.

³¹⁴ Although the full impact analysis is not required for the 24-hour standard now that the Bay Area has been redesignated as non-attainment for the 24-hour standard, the Air District notes that its approach would be appropriate for that standard as well, if it were still applicable. For the 24-hour standard, the vast majority of areas where the facility's emissions will impact ambient concentrations above the SIL are located close to the project site, within 1260 meters. (See PM_{2.5} PSD Source Impact Analysis, *supra* note 277, at p. 10, Figure 1.) Going out to six miles is more than sufficient to be conservative in order to capture all sources that could cause a significant concentration gradient in these close-in areas where the facility will have impacts over the SIL. The only other areas where the facility will have impacts above the SIL are in six isolated locations in elevated terrain to the East of the project, which are up to 8.1 km away. The six-mile point-source search encompassed potential sources out beyond those locations as well. Although the six-mile distance does not establish a search limit as far from these SIL-exceedance locations as with the locations closer in to the project site, these more distant locations are less likely to be impacted by significant concentration gradients from nearby sources because of their isolated locations.

number of sources is expected to be small except in unusual situations”, the Guideline on Air Quality Models leaves identification of nearby sources to the professional judgment of the permitting agency:

b. *Nearby Sources*: All sources expected to cause a significant concentration gradient in the vicinity of the source or sources under consideration for emission limit(s) should be explicitly modeled. The number of such sources is expected to be small except in unusual situations. Owing to both the uniqueness of variables involved in identifying nearby sources, no attempt is made here to comprehensively define this term. Rather, identification of nearby sources calls for the exercise of professional judgment by the appropriate reviewing authority (paragraph 3.0(b)). This guidance is not intended to alter the exercise of that judgment or to comprehensively define which sources are nearby.³¹⁵

The Draft NSR Workshop Manual further underscores the flexibility and judgment that permitting agencies necessarily need to apply in identifying “nearby sources” as follows:

In determining which existing point sources constitute nearby sources, the *Modeling Guideline* necessarily provides flexibility and requires judgment to be exercised by the permitting agency. Moreover, the screening method for identifying a nearby source may vary from one permitting agency to another. To identify the appropriate method, the applicant should confer with the permitting agency prior to actually modeling any existing sources.³¹⁶

The Air District followed this guidance and has applied its best engineering judgment in undertaking the full impacts analysis here. The District disagrees that its approach was inappropriate under EPA’s guidance for PSD permitting.

The Air District further notes that none of the comments identified any specific additional point sources that the Air District should have included. (Some comments did identify specific additional non-point highway sources that they thought should be included, which are addressed in the next comment below.) Some of the comments stated that every source within 50 km must be included in the multi-source modeling. But this is not the case under EPA guidance for conducting such analyses, as outlined above. To the contrary, the multi-source modeling includes only nearby sources that will have a significant concentration gradient within the impact area, and focuses only on those areas where the source’s emissions will interact with the emissions from the other nearby sources.³¹⁷ Other comments simply suggested that there are hundreds of sources, including ports, railyards, refineries and other industrial sources within 50 kilometers of the proposed facility that could potentially result in significant concentration gradients around the project area. But these comments did not identify any evidence of a significant concentration gradient from any such sources anywhere within the impact area as a

³¹⁵ 40 C.F.R. Pt. 51, App. W, § 8.2.3.b.

³¹⁶ Draft NSR Workshop Manual, p. C.32 (emphasis in original). District staff also engaged in informal consultation with expert modeling staff at EPA Region 9.

³¹⁷ See NSR Workshop Manual at p. C.32.; 40 CFR Pt. 51, App. W, § 8.2.3.e. (“The impact of nearby sources should be examined at locations where interactions between the plume of the point source under consideration and those of nearby sources (plus natural background) can occur.”)

result of any such sources, let alone at the specific locations where the proposed facility's modeled impacts also exceeded the SIL. The Air District believes that it appropriately exercised its professional judgment in identifying all nearby sources that should have been included in the analysis, and therefore is confident that its conclusion that there will be no locations where the facility's emissions will significantly contribute to any exceedance of the PM_{2.5} NAAQS is correct.

Furthermore, to the extent that the comments are suggesting that the Air District should be required to identify every emissions source within 50 km and then model each source to assess whether it would cause a significant concentration gradient within the impact area, this interpretation is not supported by EPA guidance and the District disagrees with it. EPA's Guideline on Air Quality Models is clear that "[t]he number of such sources [to be modeled] is expected to be small except in unusual situations."³¹⁸ Requiring a permitting agency to go beyond such a rule and to model every source within a 50 km radius would be a huge modeling exercise and would unduly burden agencies with resource constraints. This would not be a good use of public resources in a situation where the agency has determined based on its professional expertise that such additional sources are highly unlikely to cause a significant concentration gradient within the impact area. This certainly holds true here, where there are likely hundreds of additional sources (according to one of the comments) located beyond 6 miles but within 50 km, which could supposedly have some potential impact within the significant impact area. Under the interpretation suggested by these comments, the District would be required to model the impacts of all of these sources, based on nothing more than a commenters' speculation that such sources could cause a significant concentration gradient inside the impact area, in order to prove through modeling that there would be no significant concentration gradient. The Air District disagrees with this interpretation.

For all of the foregoing reasons, the Air District disagrees with the comments that it did not appropriately account for nearby point sources in its full impact analysis for PM_{2.5}.³¹⁹

Comment XIII.B.5. – Selection of Nearby Non-Point Sources for Full Impact Analysis:

The Air District also received comments stating that in addition to Highway 92, the District should include other highways as "nearby sources" in its full impact analysis, including Interstate 880, additional portions of Highway 92, Interstate 580, Highway 238, Highway 185, and additional arterial roads.

Response: The Air District disagrees that other roadway sections should be included in the full impacts analysis. The Air District properly included all roadway emissions that could cause a significant concentration gradient in the areas where the facility's impacts would be above the SIL. The Air District determined that these other roadway sections, even though they may lie within the 6-mile radius the District used to identify potential nearby sources, would not cause a significant concentration gradient at locations where the project's impacts would be above the

³¹⁸ 40 C.F.R. Part 51, App. W, § 8.2.3.b.

³¹⁹ Comments suggesting that the Air District should re-circulate further analysis for an additional public review and comment opportunity are addressed in Response to Comment XVII.C.4. below.

SIL. EPA's guidance is clear that the full impact analysis does not need to consider a source as a "nearby" source unless it could result in a significant concentration gradient in the same vicinity as the proposed source's impacts. That is, even if a particular highway segment might generate a significant concentration gradient *somewhere* within the impact area, but not within the same location where the source's impacts also exceed the SIL, then its exclusion from the multi-source full impact analysis is appropriate; so long as the facility's predicted impacts which exceed the SIL do not coincide in both time and location with any potential violation of the NAAQS resulting from the highway segments, then the facility cannot be found to cause or contribute to such a violation.³²⁰ Identifying the location of the proposed facility's impacts, relative to the location of such other sources, no additional sources were identified as "nearby sources" for inclusion in the full impact analysis because none of such sources could reasonably be expected to cause a significant concentration gradient in or around the same location where the proposed facility's impacts were modeled above the SIL. Accordingly, since most of the modeled locations that were above the SIL were in the immediate vicinity of the proposed project, it was appropriate not to model additional sources as part of the multi-source modeling analysis.³²¹

Comment XIII.B.6. – Incorrect Identification of Highway Segments:

The Air District received comments stating that it did not use the correct highway segments in its analysis. The comments objected that the segments identified are not located within the impact area for the project and/or are in Contra Costa County, not Alameda County.

Response: The Air District agrees that the highway segments cited in these comments are not the correct segments. The segments were misidentified in the documentation published in August of 2008 because of a typographical error. The applicant's consultant did in fact model the correct highway segments' emissions in the analysis, but the consultant mistakenly cited the names of the highway segments from another spreadsheet included within the Excel workbook when completing the report. Once this error was identified, the applicant's consultant submitted a correction to the Source Impact Analysis.³²² The Air District disagrees that this typographical error changes the substance of the analysis. To the contrary, the substance of the analysis was based on the correct segments, even if they were misidentified in the report. The segments' identification has now been corrected for the record. The Air District appreciates the comments for bringing this oversight to its attention.

Comment XIII.B.7. – Results of AERMOD Modeling Analysis:

Some commenters stated that they ran the Air District's PM_{2.5} modeling data through their air quality modeling program and got different results. They stated that their analysis produced an impact area for the full impact analysis for PM_{2.5} 24-hr impacts that extended out to 11.43 km,

³²⁰ See *In re Prairie State Generating Company*, *supra* note 6, pp. 137-144 (affirming decision to issue permit where modeled violations of the NAAQS were not coincident in both time and location with the source's modeled impacts above the SIL).

³²¹ The exponential manner in which the PM_{2.5} impacts from roadway sources falls off as one moves farther away from the source is discussed further in the Applicant's PM_{2.5} Source Impact Analysis prepared by Atmospheric Dynamics, Inc. (July 30, 2009 revision), at p. 13.

³²² Memorandum from G. Darvin (Atmospheric Dynamics) to G. Long (Bay Area Air Quality Management District), September 28, 2009.

not the 8.1 km that the District used in its analysis. They stated that they calculated that there were 8,424 receptors where the highest modeled impact from the proposed project would exceed the $1.2 \mu\text{g}/\text{m}^3$ SIL, not 6,019 as calculated in the District's analysis. These commenters opined that the difference between the outcomes was because the commenters used EPA's AERMOD program whereas the District used a commercial version of the program. These comments were based upon records the commenters construed as indicating that the District's modeling files were generated using "BEE-Line Software". The comments stated that the program used in the District's analysis was a private proprietary program, and that Appendix W does not allow the use of a proprietary model and source code. The comments stated that the District should use the appropriate AERMOD program in its PSD Air Quality Impact Analysis.

Response: The issue of exactly how far out to extend the 24-hour impact area is now moot, as 24-hour impacts are no longer part of the PSD permit review now that the Bay Area has been designated as non-attainment of the 24-hour NAAQS. The Air District therefore disagrees that anything in this comment provides a reason to revisit its permitting analysis. The comment does not contend that use of an 8.1 km impact area for the annual standard was inappropriate, and the Air District observes that an 8.1 km impact area was actually very highly conservative for the annual analysis given that annual impacts above the SIL were not found more than approximately 450 meters from the project site.

The Air District nevertheless responds on the substantive issue raised by these comments in order to provide full information to the public and to assure interested parties that the Air District used the correct approach for a PSD permit analysis. Based upon the Air District's analysis, the discrepancy between the commenter's modeled results and those of the applicant and Air District appears to have resulted from the commenter's use of the wrong emission rate for the gas turbines. The commenters stated that they used an emission rate of 1.134 grams per second (g/s), which they note is higher than the rate of 0.945 g/s specified by the applicant's Source Impact Analysis. Apparently, the commenters selected the wrong emissions rate because the commenters had relied upon an outdated modeling report generated by the Air District, which used the combustion turbine/HRSG emissions rate proposed in the December 2008 Draft Permit (9 lbs/hr), rather than the reduced emissions rate (7.5 lb/hr) proposed in the August 2009 Draft Permit and in the modeling reports referenced in the Additional Statement of Basis. (The higher emission rate of 9 lb/hr equals 1.134 g/s.) According to the Air District's assessment, the differences which the commenter modeled resulted from its use of the wrong emissions rate, and not from any other difference in the modeling inputs or methods.

With respect to the modeling program used, the Air District disagrees that it used a proprietary commercial version of the AERMOD software. To the contrary, the Air District used the same publicly available AERMOD program that the commenters apparently did. The reference to the proprietary "BEE-Line Software" relates to graphical user interface software that makes it easier to input the modeling data that will be used in the AERMOD analysis. This software takes the input information and then organizes it into a format that can be used in the AERMOD program. The actual dispersion model itself that the Air District used, along with the AERMOD input and output files, are based upon the publicly available software. The only additional software that the Air District used was the graphical user interface on the front end to help streamline data inputting. (Note also that the applicant did not use any third-party input programs for the

modeling analysis that it provided.) For these reasons, the Air District disagrees with these comments that the District would get different results if it used a different modeling program. The Air District used the same publicly-available AERMOD program as the commenters did, and the discrepancy in the commenters' results comes from the fact that they used incorrect inputs, not because they used a different modeling program. But again, the issue is now moot with respect to the Air District's decision to issue the permit because the 24-hour analysis is no longer part of the PSD permit requirements.

Comment XIII.B.8. – Background Ambient PM_{2.5} Levels:

The Air District also received comments objecting to its reliance upon the convention of using the “highest-eighth-high” 24-hour background concentration for each year of the past three calendar years and averaging them together to identify the appropriate background concentration for use in the multi-source analysis. The comments claimed that this approach was only appropriate for purposes of assessing the attainment/nonattainment status of the area where the monitoring station was located. Rather, according to these comments, the Air District should have used the highest 98th percentile concentration from any single year and applied that as the background concentration, given that the proposed source will operate for 30 years. The comments stated that this approach would have resulted in background levels of PM_{2.5} (24-hour average) of 33.3 µg/m³, not the 29.0 µg/m³ as used the District's analysis. They claimed that using the 98th percentile figure for the highest single year is more conservative and is consistent with the approach taken by the District's Permit Modeling Guidance (2007), which states that the highest 2nd-high concentration should be used as background for comparison with the national standards. The comments stated that using a more conservative 33.3 µg/m³ background, the modeling results show an impact that would cause or contribute to a violation of the NAAQS.

Response: The issue of what 24-hour PM_{2.5} background concentration to use in the 24-hour analysis is now moot, as 24-hour impacts are no longer part of the PSD permit review now that the Bay Area has been designated as non-attainment of the 24-hour NAAQS. The Air District therefore disagrees that anything in these comments provides a reason to revisit its permitting analysis.

The Air District nevertheless responds on the substantive issue raised by these comments in order to provide full information to the public and to assure interested parties that the Air District used the correct approach for a PSD permit analysis. EPA's modeling guidelines that govern the PSD Source Impact Analysis prescribe the use of the three-year average of the 98th percentile of daily average concentrations (the “highest-eighth-high”) for determining whether proposed facility would cause or contribute to a violation of the NAAQS.³²³ This approach is required for PSD source impact analyses, not just for purposes of determining the attainment/nonattainment status of the area where the monitoring station was located as suggested by these comments. It is set forth in Section 10 of EPA's Guideline on Air Quality Models, which specifies that it is

³²³ See 40 C.F.R. Pt. 51, App. W, § 10.1.c. (“Standards for fine particulate matter (PM-2.5) are expressed in terms of both long-term (annual) and short-term (daily) averages. The long-term standard is calculated using the three year average of the annual averages while the short-term standard is calculated using the three year average of the 98th percentile of the daily average concentration.”)

applicable for PSD permitting analyses.³²⁴ This approach also reflects generally accepted practice among permitting agencies in issuing PSD permits.³²⁵ The Air District therefore disagrees that its use of the highest-eighth-high background number was inappropriate.

The Air District also disagrees with the comments' assertion that the length of time that the proposed facility will operate should cause the District to depart from EPA's requirements and instead use the highest 98th percentile concentration for any single year as the basis for determining compliance with the 24-hour standard. EPA's Guideline on Air Quality Models was developed specifically with sources such as the proposed facility in mind and there is no indication that the proposed facility's expected life is different than the expected life of any other facility that would be subject to PSD permitting. There is nothing about this situation that would warrant a departure from the EPA Guidelines.

The Air District also disagrees that its Permit Modeling Guidance suggests otherwise. First of all, as a federal PSD permit EPA's Guideline would take precedence over any District guidance. But in any event, the District's Guidance does not differ from EPA's Guideline. The provisions in the District's Guidance on using the highest-second-high in the three-year period as the basis for establishing existing background concentrations is aimed at other criteria pollutants (not including particulate matter) for which the analysis is based on "the highest, second-highest estimated concentration for averaging times of 24-hours or less".³²⁶ The Air District's own policy was intended to reflect the approach to be taken for these other pollutants, and does not reflect the approach to be taken for PM_{2.5}, for which the Air District has not yet adopted its own regulations.

For all these reasons, the Air District continues to believe that using the highest-eight-high – the three-year average of the 98th percentile of daily average concentrations – properly establishes background concentrations for the PSD Source Impact Analysis. But in any event, the issue is now moot because the 24-hour standard is no longer part of the PSD analysis. The comments did not make any reference to this issue in connection with the annual PM_{2.5} standard, and in any event the District is not aware of any reason why the annual analysis would be any different even if a single-highest-year approach was used.

³²⁴ *Id.*, § 10.1.a, 10.1.d.

³²⁵ *See, e.g.*, CTDEP Interim PM_{2.5} New Source Review Modeling Policy and Procedures, Gina McCarthy, Commissioner, Connecticut Department of Environmental Protection, issued August 21, 2007, restated February 11, 2009 at: www.ct.gov/dep/lib/dep/permits_and_licenses/air_emissions_permits/nsrmodelingplan.pdf; Interim Permitting and Modeling Procedures for Sources Emitting between 10-100 Tons per Year of PM_{2.5} (Fine Particulate) (Revised to include 2008 PM_{2.5} Monitoring Data), State of New Jersey, Department of Environmental Protection, Division of Air Quality, March 17, 2009; available at: www.nj.gov/dep/aqpp/downloads/PM-2.5modelingpolicy_Mar2009.pdf ("The 24-hour background PM_{2.5} value should initially be based on the average of the 98th percentile 24-hour value measured over the latest 3-years of available data.").

³²⁶ 40 C.F.R. Part 51, App. W, § 10.2.3.2.a.

Comment XIII.B.9. – Consideration of Greenhouse Gases on Formation of PM_{2.5}:

The Air District also received comments stating that its analysis may have underestimated the impacts on PM_{2.5} concentrations from the facility because of the potential for CO₂ to increase particulate matter formation. These comments cited recent studies published by Mark Z. Jacobson, a researcher at Stanford University, suggesting that increased levels of CO₂ in the local atmosphere can increase local temperatures and alter atmospheric chemistry. According to Dr. Jacobson's studies cited in these comments, increases in CO₂ concentrations in the local atmosphere will reduce PM_{2.5} levels because of higher temperatures, but various other atmospheric processes will cause increases that would more than offset these decreases. The comments stated that the Air District should include the potential effects of increased CO₂ concentrations on PM_{2.5} formation in its PM_{2.5} source impact analysis, based on the findings published by Dr. Jacobson. The comments suggested that the Air District could assess the additional impacts of increase CO₂ concentrations by (i) taking its modeled PM_{2.5} impacts and then applying Dr. Jacobson's approach to adjust that result, or (ii) evaluating how CO₂ emissions will affect temperature and aerosol water content (and presumably other factors related to atmospheric chemistry) and then using that information to adjust the underlying models that are used to predict PM_{2.5} concentrations. The comments stated that if the effects that Dr. Jacobson predicts regarding additional PM_{2.5} formation from increased CO₂ levels are added to the impacts that the Air District has already modeled, the analysis would conclude that the facility will cause or contribute to an exceedance of the PM_{2.5} NAAQS.

Response: The Air District disagrees that it should revisit the PM_{2.5} analysis that it undertook based on Dr. Jacobson's recent research. Moreover, the Air District also disagrees that applying Dr. Jacobson's hypothesis to the results of its analysis would alter the conclusion that the facility will not cause or contribute to a violation of the NAAQS. Even reading Dr. Jacobson's work in the most conservative light possible, it still predicts only a slight increase in ambient PM_{2.5} concentrations, and a small additional impact of this level of magnitude would not change the outcome of the District's analysis.

Before addressing the substance of Dr. Jacobson's research, the Air District first notes that under the PSD regulations it is required to use applicable EPA-approved air quality models as set forth in Appendix W for its Source Impact Analysis.³²⁷ The Air District is therefore bound under EPA's PSD program to use the AERMOD model it used to evaluate PM_{2.5} impacts, and cannot substitute a different analysis based on Dr. Jacobson's research.

Moreover, even if the Air District were free to pick and choose what approach it could take for modeling PM_{2.5} impacts in a Federal PSD permitting analysis, it would be hesitant to include CO₂ as a factor in its modeling based on Dr. Jacobson's paper because of the relatively preliminary nature of Dr. Jacobson's research. The science of atmospheric chemistry is very complicated and there are a large number of variables that will influence the amount of PM_{2.5} that may result in a particular situation, as Dr. Jacobson acknowledges. He notes in his paper

³²⁷ See 40 C.F.R. § 52.21(l)(1). The regulations allow for modifying such EPA-approved models only in very limited circumstances, upon written approval of the Administrator and after public notice and comment. See *id.* § 52.21(l)(2). There is no indication that the Administrator would support departing from the EPA-approved models here based on Dr. Jacobson's paper.

that increases in CO₂ levels will have conflicting impacts on PM_{2.5} levels, with the resulting higher temperatures reducing PM_{2.5} levels and the increased aerosol water content and other factors increasing PM_{2.5} levels. This tension between PM_{2.5} decreases and increases from increases in CO₂ is also borne out in Dr. Jacobson's specific modeling results, which show a range of overall PM_{2.5} impacts from a decrease of 0.007 µg/m³ throughout California as a whole to an increase of 0.06 µg/m³ when looking at the Los Angeles area specifically.³²⁸ Dr. Jacobson ultimately concludes that the increases will predominate over the decreases, but the fact that PM_{2.5} levels involve multiple offsetting atmospheric processes and not a single, simple cause-and-effect relationship counsels caution in adopting Dr. Jacobson's hypothesis in a PSD modeling analysis. Furthermore, Dr. Jacobson's research in this area is very recent and there has not been time for a scientific consensus to develop around it with sufficient certainty for it to be used as a basis for a PSD Source Impact Analysis modeling exercise. For all of these reasons, the Air District does not believe that it would be appropriate here to depart from the EPA-approved AERMOD modeling approach it used based on Dr. Jacobson's research at this point. The Air District will continue to monitor the ongoing research in this area to see whether the accepted modeling protocols will incorporate CO₂ levels as an input into the model. But at this point, at least, the Air District disagrees that Dr. Jacobson's study provides grounds for departing from EPA's AERMOD model under 40 C.F.R. Section 52.21(l) and 40 C.F.R. Part 51, Appendix W.

Nevertheless, despite the developing nature of the science on this issue and the Air District's determination that it does not justify departing from the AERMOD approach, the District considered what affect Dr. Jacobson's hypothesis – if it is ultimately confirmed – would have on the PM_{2.5} impacts with respect to this facility, as requested in these comments. The Air District followed the first approach suggested in the comments of taking the PM_{2.5} numbers the Air District calculated using AERMOD and then adjusting them using Dr. Jacobson's published research. As noted above, Dr. Jacobson's calculations conclude that anthropogenic CO₂ emissions could affect ambient PM_{2.5} concentrations within a range of a 0.007 µg/m³ decrease to a 0.06 µg/m³ increase taking into account all land areas equally (or a 0.041 µg/m³ to 0.029 µg/m³ increase on a population-weighted basis). Conservatively taking the most significant modeled increase, Dr. Jacobson's model predicts an increase from anthropogenic CO₂ emissions of 0.8%

³²⁸ See Jacobson Paper, *supra* note 35, at p. 12, Figure 1, line 3 (“PM_{2.5} (µg/m³) (all land)”). These numbers are Dr. Jacobson's published findings taking into account all land areas equally. Dr. Jacobson also calculated “population-weighted” numbers that give more weight to PM_{2.5} increases in populated areas, which resulted in slightly higher numbers (ranging from 0.041 µg/m³ throughout the entire United States to 0.29 µg/m³ in the Los Angeles Area specifically). The Air District believes that the numbers based on all land areas make the best comparators for the PSD Source Impact Analysis, since that analysis considers all land and does not use a “population-weighted” approach (although it certainly could be argued that a “population weighted” approach would also be appropriate for a high-population region such as the San Francisco Bay Area). But even taking the higher population-weighted numbers, the broad range that Dr. Jacobson found in his calculations – the high and low numbers differ by a factor of 7 – show how sensitive the tradeoffs between PM_{2.5} increases and decreases can be.

above the ambient concentrations that would otherwise occur.³²⁹ Applying this highest increase predicted by Dr. Jacobson's findings to the maximum total combined ambient air concentration the Air District calculated using AERMOD – which was 10.56 $\mu\text{g}/\text{m}^3$, as described above – the total $\text{PM}_{2.5}$ concentration resulting from *all* of the anthropogenic CO_2 emissions included in Dr. Jacobson's study would come to 10.65 $\mu\text{g}/\text{m}^3$. This result, taking Dr. Jacobson's published findings at face value and taking the most conservative impact on $\text{PM}_{2.5}$ that he predicts from *all* anthropogenic CO_2 sources, will still be far below the $\text{PM}_{2.5}$ NAAQS of 15 $\mu\text{g}/\text{m}^3$. If one were to break out only this facility's CO_2 emissions from all of the other anthropogenic CO_2 emissions sources, which Dr. Jacobson included in his study, the impacts would be even less.³³⁰ But either way, it is clear that even taking Dr. Jacobson's study into account in the manner suggested in these comments, the predicted impacts would still not show a violation of the NAAQS. The Air District therefore disagrees that, even if Dr. Jacobson's approach were applied to the Source Impact Analysis for this facility, it could provide any reason for the Air District to alter its conclusion that the facility will not cause or contribute to a violation of the annual ambient air quality standard for $\text{PM}_{2.5}$.

Comment XIII.B.10. – Final Version of Applicant's Source Impact Analysis:

The Air District received comments noting some changes between two versions of the applicant's Source Impact Analysis prepared for the Air District's review by the applicant's consultant, one of which is dated July 27, 2009, and the other of which is dated July 30, 2009. The commenters stated that they disagreed with assertions made by Calpine's counsel that the changes were "minor".

Response: The Air District has evaluated the changes made between the two versions of the applicant's Source Impact Report in response to these comments. The principal difference is that in the initial version, the applicant identified multiple separate "impact areas", including a compact 1.26 kilometer (km) impact area immediately surrounding the project site due primarily to emissions from the cooling tower, and an isolated set of impact areas in elevated terrain to the east of the project site due to emissions from the gas turbines/HRSGs. The applicant claims that it identified impact areas in this manner based on guidance in the NSR Workshop Manual, which provides that "[u]sually the area of modeled significant impact does not have a continuous, smooth border... [but] may actually be comprised of pockets of significant impact separated by pockets of insignificant impact." (See Draft NSR Workshop Manual, C-26.) Based on further consideration and on discussions with the Air District, the applicant revised its analysis to define a single impact area that include the entire area within the radius extending out to the farthest

³²⁹ See *id.* at p. 12, Figure 1, line 2, columns 2 and 3 (increase of 0.29 $\mu\text{g}/\text{m}^3$ compared to ambient concentration of 36 $\mu\text{g}/\text{m}^3$, or 0.8%).

³³⁰ Comments asserted that the facility's CO_2 emissions will be over 10% of all of the CO_2 emissions from within Alameda County. But the County is not the appropriate area for comparing CO_2 emissions even under an analysis of local CO_2 effects such as Dr. Jacobson's. Dr. Jacobson posits that CO_2 will form "domes" over entire metropolitan areas, not individual counties. He specifically identifies the " CO_2 dome" for this region as applying to the entire San Francisco Bay Area, not just an individual county. (See Jacobson Paper, *supra* note 35, at p. 3, line 26.) The facility's percentage of CO_2 emissions from the entire Bay Area will be substantially less than 10%.

point where any modeled impact exceeded the SIL. The Air District believes that this latter approach is preferable and more in accordance with the NSR Workshop Manual guidance, and it is this latter approach that the Air District used in its PSD review and analysis in the Additional Statement of Basis. (See Additional Statement of Basis at pp. 85-88.³³¹)

The differences between the initial report and the revised report are immaterial for a number of reasons. First, the Air District followed the latter correct approach in evaluating the Source Impact Analysis; it did not base its decision on the earlier report or the approach identifying multiple impact areas. Furthermore, both analyses examined the entirety of the larger impact area for other sources that might cause a significant concentration gradient within the vicinity of the proposed source's impacts, and included emissions from sources located within the larger impact area, but outside of the smaller identified impact areas. For these reasons, the Air District disagrees that the fact that Calpine described the impact area differently in the earlier version of its Source Impact Analysis makes no difference in the outcome of the PSD Source Impact Analysis review.

Comment XIII.B.11. – Conclusion of No Contribution To A Violation of NAAQS or PSD Increment:

Several commenters questioned how the Air District could conclude that the project's emissions would not cause or contribute to a violation of any NAAQS or PSD increment. In particular, they stated that the Air District is already in violation of the PM_{2.5} NAAQS, and so any additional PM_{2.5} emissions would contribute to that violation.

Response: The fact that the PSD Source Impact Analysis showed no contribution to a violation of the 24-hour NAAQS in a situation where ambient air in the Bay Area already exceeds the NAAQS was the result of several factors. The main factor was that the Bay Area's legal designation as non-attainment had not become effective when the District conducted its analysis, so it had to apply the PSD Source Impact Analysis requirements, which are primarily intended for areas that do not exceed the NAAQS, to be applied. Another factor was that although ambient air in the Bay Area exceeds the 24-hour NAAQS in some places, there are some places where ambient air concentrations are below the NAAQS. As the Air District's analysis showed, the project location was one of them, where background concentrations are at 29.0 µg/m³, somewhat less than the NAAQS of 35 µg/m³. This allows for some additional impact from the facility without exceeding the standard. And finally, the PSD Source Impact Analysis requirements allow a source to have some emissions even where the NAAQS are exceeded, as long as the facility is not a significant contributor to the exceedance as explained above. For all of these reasons, the PSD Source Impact Analysis for the 24-hour standard found that the facility would not cause or contribute to a violation of the NAAQS. But that conclusion is now moot, of

³³¹ Note also that this approach was based on the impacts above the 24-hour SIL, which is no longer applicable since the Bay Area has been designated as non-attainment for the 24-hour standard. The applicable impact area for the annual standard extends only out to the farthest point where the facility will have impacts above the annual SIL, which was only 0.45 km from the project location. So even the using a 1.26 km radius for the impact area would still have been overly conservative. In the end, of course, the Air District used the full 8.1 km radius out to the farthest point with an impact above the 24-hour SIL.

course, as the Bay Area has been redesignated as non-attainment and a 24-hour analysis is no longer required for the PSD permit.

Comment XIII.B.12. – Potential For Impacts Above the SIL in Adjacent Non-Attainment Areas:

Commenters stated that the Bay Area is in non-attainment of the PM_{2.5} NAAQS and that where a source will cause an impact above the Significant Impact Level in a non-attainment area it is not eligible for a PSD permit. The commenters cited some language from the preamble to the proposed PM_{2.5} SIL rule about facilities in attainment areas having impacts in an adjacent non-attainment area.

Response: The commenters are apparently confused in their reading of the rules regarding impacts in adjacent non-attainment areas to mean that any impacts above the SILs here require offsetting emissions reductions. The language and regulatory requirements quoted by the commenters apply in situations where a source is located near the edge of an attainment/unclassifiable area, and emissions from the source may have impacts above the SILs beyond the edge of the attainment/unclassifiable area in an adjacent area that is non-attainment. In such a case, the source must obtain offsetting emissions reductions to compensate for the significant increase in the adjacent non-attainment area. This situation is not applicable here. The source impact analysis does not show any impacts from the proposed facility outside of the San Francisco Bay Area. The only impacts above the SILs are wholly within the San Francisco Bay Area.

The commenters did note that as a matter of fact ambient air quality measurements within that area have been found to be above the 24-hour NAAQS, and based on that data EPA has adopted a non-attainment designation for the Bay Area for the 24-hour NAAQS, although that designation has not yet been published in the Federal Register and so is not yet effective. But even if the Bay Area did have an effective 24-hour PM_{2.5} non-attainment designation, that would not impose the additional PSD permitting requirements that the commenters assert are applicable here regarding providing offsetting emissions reductions as part of the PSD permitting process. If and when the Bay Area's non-attainment designation becomes effective, that will make PM_{2.5} sources subject to Non-Attainment NSR permitting requirements under Appendix S of 40 C.F.R. Part 51, as the District explained in the Additional Statement of Basis. Any requirement for offsets would therefore be subject to the Appendix S rules, not the PSD rules. And as the District explained in the Additional Statement of Basis, Appendix S would not require any offsets for a project of this size.

For all of these reasons, the Air District disagrees with these commenters that the language in EPA's preamble for the proposed SILs rule regarding impacts in adjacent non-attainment areas requires the proposed facility to provide offsetting emissions reductions as part of its PSD permit.

Comment XIII.B.13. – Use of AERMOD to Model Impacts at Point Reyes National Seashore:

The Air District received comments criticizing the modeling that it used to conclude that the project would have no significant impact at Point Reyes National Seashore, a Class I area.

Specifically, the comments criticized the Air District’s use of AERMOD for this modeling. The comments stated that AERMOD can be used to model impacts only out to a distance of 50 km from the proposed source, whereas Point Reyes is 62 km away. The comments stated that EPA’s modeling guideline, 40 C.F.R. Part 51, Appendix W, states that CALPUFF should be used for modeling impacts at that distance. (The commenters did not state that CALPUFF would give any different results, however.)

Response: Although the Additional Statement of Basis only referenced the previously conducted AERMOD analysis, the applicant had also previously conducted a CALPUFF modeling analysis as well.³³² CALPUFF, as the comments correctly note, is an appropriate regulatory model for evaluation of long-range transport and chemical transformation. In response to these comments, the applicant provided an updated CALPUFF modeling analysis for the impact of the project’s emission on Point Reyes National Seashore. To assess the potential for air quality impacts at the nearest Class I area, Point Reyes National Seashore (70 kilometers from the project site), the CALPUFF long-range transport model was used in a screening mode to assess the impacts of particulate matter (PM₁₀ and PM_{2.5}). The screening mode of CALPUFF uses a 3-dimensional homogeneous meteorological field for simulating transport and dispersion of pollutants for each hour. Specifically, five years of hourly surface and upper air data are required to identify the worst-case impacts when applying CALPUFF in a screening model. The results of the CALPUFF analysis are set forth in Table 7 below, which lists the modeled impacts at the Point Reyes National Seashore Class I area as compared to the Class I SILs and PSD increments.³³³

Table 7: Summary of CALPUFF Class I Modeling Analysis Results

Pollutant	Averaging Interval	Modeled Impact Point Reyes (µg/m³)	Class I SIL (µg/m³)	Class I PSD Increment (µg/m³)
PM _{2.5}	24-hr	0.0529	0.07	2
	annual	0.0024	0.04	1
PM ₁₀	24-hr	0.0529	0.3	10
	annual	0.0024	0.2	5

This analysis demonstrates that no significant impacts on Class I areas are expected as a result of the proposed project.³³⁴

³³² Additional details regarding the Class I Impacts Analysis can be found in the earlier submittal, dated February 2007.

³³³ See Summary of CALPUFF Class I Modeling Analysis Results, prepared by Greg Darvin, Atmospheric Dynamics, October 14, 2009. Note that the Class I PM_{2.5} SILs and increments applied by the Air District and appearing in Table 7 were developed in accordance with the methods and rationale described previously. (See *supra* note 290.).

³³⁴ The Air District notes that in the Additional Statement of Basis it incorrectly described the Class I SIL. (See Additional Statement of Basis at p. 89, citing a Class I SIL of 1.0 µg/m³, which would result in a less stringent analysis than described herein.) The Air District did not receive any comments on this issue, but it has nevertheless clarified that the facility will not have Class I

Comment XIII.B.14. – Don Edwards National Wildlife Sanctuary as a Class I Area:

The Air District received comments suggesting that the Don Edwards National Wildlife Sanctuary near the project location should be considered a Class I area for PSD purposes.

Response: The Don Edwards San Francisco Bay National Wildlife Refuge is not designated as a Class I area.³³⁵ The list of Class I areas includes certain international parks, national wildlife areas, national memorial parks, and national parks. The list was initially established by Congress. The process for redesignation of an existing Class II area as a Class I area is set forth by EPA’s PSD regulations at 40 C.F.R. 52.21(g).

C. Soils & Vegetation Analysis

The Air District also received a number of comments on its Soils and Vegetation analysis. Some of the comments stated that the Air District should include PM_{2.5} in the analysis, which the District excluded in the initial Statement of Basis based on EPA’s PM₁₀ surrogacy policy described above. After the first comment period, the Air District departed from that policy and determined that it should include PM_{2.5}, which it did in a revised soils and vegetation analysis it published in connection with the August 2009 Additional Statement of Basis. The revised soils and vegetation analysis also updated the biological survey information in response to comments from the public, and also evaluated potential impacts from nitrogen deposition, among other revisions.³³⁶ The Air District then received further comments on these issues during the second comment period. This section addresses all of the comments the Air District received regarding its soils and vegetation analysis during both comment periods.

Comment XIII.C.1. – Analysis of Soils & Vegetation Impacts:

The Air District received a comment objecting that there was no analysis of potential impacts to soils and vegetation (as well as visibility), and that there would be such impacts.

Response: The Air District disagrees with this comment. Impacts to visibility, soils, and vegetation were analyzed in great detail in the Air Quality Impact Analysis, and that analysis was revised and expanded upon in the Additional Statement of Basis. (*See* Statement of Basis, Appendix C; Additional Statement of Basis at pp. 89-91.) The numerous comments the Air District received on these issues highlights the fact that they were discussed at length in these documents. Furthermore, since the close of the comment periods EPA and the US Fish & Wildlife Service have completed their evaluation of the potential for endangered species impacts

impacts above the correct significance levels, which are set forth above. This issue does not affect the outcome of the Source Impact Analysis, but the Air District notes this correction for the record.

³³⁵ *See* U.S. Department of the Interior, National Park Service, alphabetical listing of all Fish and Wildlife Service Class I areas at: www.nature.nps.gov/air/Maps/FWSTextList.cfm. *See also* “Mandatory Class I Areas”, identifying all National Park Service, Fish and Wildlife Service and Forest Service Class I areas at: www.nature.nps.gov/air/Maps/images/ClassIAreas.jpg.

³³⁶ The Air District’s Revised Soils and Vegetation Analysis is set forth in Memorandum from Glen Long to Weyman Lee, July 27, 2009.

from the project, which included a review of sensitive species habitat. Those agencies have concluded that there would not be any adverse impact to such habitats. Those findings are discussed in more detail in Response to Comments XIII.C.3., XIII.C.4., and XIX.1.

Comment XIII.C.2. – Survey of Existing Soils & Vegetation Resources:

The Air District received several comments during the initial comment period criticizing the inventory of existing soils and vegetation resources in the vicinity of the project. These comments criticized the use of a soils and vegetation survey conducted for the original Energy Commission proceeding in 2001, and claimed that an updated survey should be used. The comments stated that the inventory based on this older survey mischaracterized the project vicinity in a number of areas. The comments further stated that the soils and vegetation inventory omitted several plant species in the vicinity of the project location because of this situation. Some comments also criticized the survey for being based on just one survey conducted in the spring, which the commenters claimed does not follow accepted protocols that call for multiple visits throughout the blooming season. These comments claimed that the survey therefore missed a population of *Centromadia parryi ssp. Congdonii* (Congdon's tarplant³³⁷) at a vernal pool in the vicinity of the project, and incorrectly concluded that there is no habitat for this plant in the project area. These comments also stated that the survey does not indicate whether the Hayward Regional Shoreline was surveyed, or whether the hills to the east were surveyed where maximum nitrogen deposition impacts will occur and where there are known rare plant populations.

Response: In response to these initial comments, the Air District revised its inventory of soils and vegetation resources based on an updated survey of the project location as well as a review of the California Department of Fish and Game's California Natural Diversity Data Base ("CNDDDB"). This updated inventory is outlined in the revised soils and vegetation analysis for the project, which includes the Congdon's tarplant and all other plant species that were observed or could potentially be found in the vicinity of the proposed project. The Air District published this revised soils & vegetation analysis with the Additional Statement of Basis in August 2009. During the second comment period, the Air District received further comments stating that the revised biological survey for the new site, which was used in preparing the revised Soils & Vegetation Analysis, was incorrect in concluding that there are no populations of Congdon's tarplant within 2 miles of the new site. These comments stated that the person who performed the survey checked the CNDDDB and did not find any reported occurrences of Congdon's tarplant, but that there is in fact a population of Congdon's tarplant within 2 miles, at the KFAX radio tower broadcast site, that does not yet appear in the CNDDDB. The commenter also restated the more general criticisms of the methodology used to conduct the biological survey in general made during the first comment period, voicing generalized criticisms of the quality of the research and analysis underlying the soils & vegetation analysis.

The Air District has reviewed these further comments, but they do not provide any evidence to suggest that the Air District's conclusion that the project will not adversely impact any sensitive plant species is incorrect in any way. While the commenter may have correctly located and

³³⁷ Congdon's tarplant is officially called *Centromadia parryi ssp. condgonii*. It was formerly known as *Hemizonia parryi ssp. condgonii*.

identified a population of Congdon's tarplant on the formerly proposed location for the project, this is not inconsistent with the Air District's analysis. The Air District explicitly identified Congdon's tarplant as a special status plant species that could potentially exist in the vicinity of the project, and included it in the analysis of whether the facility's emissions will have any impacts on such species. The fact that the Air District proceeded on an assumption that there could potentially be such a population in the area, instead of a confirmed identification that there actually is such a population in the area, does not make any difference to this analysis. The further comments on this issue do not claim otherwise, and do not claim that there will in fact be any impacts to the population of Congdon's tarplant that the commenter identified. Furthermore, upon receiving this comment the applicant confirmed that the highest amount of nitrogen deposition predicted to occur at the location where the commenter found the population was approximately 0.21 kg/ha/yr, which is, again, more than an order of magnitude below any threshold of concern.³³⁸ For all of these reasons, the Air District therefore concludes that the conclusion it reached is valid.³³⁹ The emissions from the facility will not cause any significant adverse impacts to any soils and vegetation resources, including any populations of Congdon's tarplant.

Comment XIII.C.3. – Analysis of Potential Soils & Vegetation Impacts from Nitrogen Deposition:

The Air District also received several comments criticizing its soils and vegetation analysis for not considering the potential for impacts from nitrogen deposition as a result of the project. The comments stated that the Air District should evaluate the potential for soils and vegetation impacts in the Hayward Regional Shoreline and in several park areas in the East Bay hills. These comments expressed a concern that non-native vegetation would be able to out-compete native vegetation, which is better adapted to nitrogen-poor soils, if significant additional nitrogen deposition caused those soils to become more nitrogen-rich. These comments also coincided with further evaluation of the potential for nitrogen deposition-related impacts by EPA Region 9 and the Fish & Wildlife Service ("FWS").

Response: In response to these comments, a nitrogen deposition analysis was undertaken for the project, as described in more detail in the Air District's revised soils and vegetation analysis.³⁴⁰ Nitrogen deposition was modeled using both the AERMIC Model (AERMOD) and CALPUFF air dispersion model. According to the Applicant's assessment, the maximum annual deposition rates calculated by AERMOD in areas potentially occupied by selected species range from 0.02 to 0.37 kilograms per hectare per year (kg/ha/yr), which is more than ten times below the levels

³³⁸ See Nitrogen deposition modeling files, prepared by Gregory Darvin, Atmospheric Dynamics; Nitrogen Deposition Analysis, *infra* note 340, at p.3.

³³⁹ Although the comments stated generalized criticisms of the manner in which the soils and vegetation survey was carried out, they did not cite any specific errors (other than the failure to locate this plant population) or otherwise state that soils and vegetation impacts analysis should have reached a different conclusion. The Air District therefore disagrees that the analysis is defective in any material way.

³⁴⁰ See *Russell City Energy Center: Nitrogen Deposition at East Bay Regional Parks*, Technical Memorandum from Craig Williams, Biologist, CH2M Hill, to Barbara McBride, Calpine, February 19, 2009, as updated February 29, 2009 (hereinafter, "Nitrogen Deposition Analysis").

where limited invasion of non-native species have been observed (4-5 kg/ha/yr). The maximum annual deposition rates calculated by CALPUFF are more than 100 times below such levels. These results demonstrate that nitrogen deposition from the proposed facility will not result in adverse effects on soils or vegetation resources. The modeled deposition rates reflect a number of conservative assumptions and therefore represent an over-estimation of the actual deposition expected to occur as a result of the project. Even so, the modeled impacts fall far below the levels of concern identified by earlier studies. Based on this nitrogen deposition analysis and other relevant information, the US FWS and EPA have concluded that there will be no significant impacts from nitrogen deposition associated with the facility.³⁴¹ The Air District has reviewed the analysis itself, and concurs with the conclusions of FWS and EPA. There will be no significant nitrogen deposition impacts associated with this facility.

The Air District published the results of this nitrogen deposition analysis in the Additional Statement of Basis and invited public comment on it. The District received comments criticizing the analysis on the grounds that it did not examine the project's contribution to nitrogen deposition impacts in the area. The comments stated that the analysis attempts to quantify the East Bay Regional Parks current nitrogen deposition impacts, and does not take into account the impacts that would be caused by the project itself. The comments cited documents from the CEC proceeding for the Metcalf Energy Center to assert that there could be nitrogen deposition concerns related to the proposed Russell City project, and that this deposition would impact an already burdened ecosystem. In response to these further comments, the Air District disagrees that the nitrogen deposition analysis was inadequate. Contrary to the commenters' assertions, the analysis did evaluate the project's contribution to nitrogen deposition in the sensitive areas evaluated. As explained above, the analysis reviewed the project's impacts on nitrogen deposition in these sensitive areas, and found that it would be well below levels where adverse effects would result.³⁴²

³⁴¹ See Letter from G. Rios, EPA Region 9, to B. Young, BAAQMD, re "Section 7 Endangered Species Act Consultation for the Proposed Russell City Energy Center – Hayward, CA" (Jan. 28, 2010) (hereinafter, "EPA ESA Consultation Letter"); Letter from C. Goude, USFWS, to G. Rios, EPA Region 9, re "Endangered Species Informal Consultation on the Proposed Russell City Energy Center Project by Calpine/GE Capital; City of Hayward, Alameda County, CA (Jan. 25, 2010) (hereinafter, "USFWS ESA Consultation Letter"); T. Maurer, USFWS, Technical Assessment: Listed Species and Nitrogen Deposition from the Russell City Energy Center (Jan. 11, 2010) (hereinafter, "Maurer Nitrogen Deposition Assessment").

³⁴² See Letter from Barbara McBride (Calpine) to Anita Lee, PhD (EPA), February 20, 2009, p. 2; Nitrogen Deposition Analysis, *supra* note 340, at p. 3. The Air District also received comments stating that it did not address the potential impacts of ammonia or other toxins on vegetation. The Air District disagrees. The nitrogen deposition analysis specifically included the potential for nitrogen deposition impacts from all potential nitrogen sources, including the facility's ammonia emissions. See *id.*, Nitrogen Deposition Analysis, *supra* note 340, Attachment A, Air Dispersion Modeling Technical Report, *Depositional Modeling Results from the Russell City Energy Center Operation Critical Habitat Areas*, p. 4 (describing AERMOD modeling assumptions to include "100 percent conversion of oxides of nitrogen (NO_x) and ammonia (NH₃) into atmospherically derived nitrogen (ADN)"). The commenter has not cited

The Air District also received comments during the second comment period criticizing the nitrogen deposition analysis by claiming that the analysis wrongly characterized certain areas within the East Bay Regional Parks as forest rather than grassland. These comments alleged that, to model correctly for the impacts to the critical habitats of these species requires a fundamental understanding of what constitutes critical habitat for each species and how nitrogen deposition could potentially have impacts upon that habitat. Because of the deficiencies the comments claimed are inherent in computer modeling of environmental impacts, the comments stated that a full biological opinion was warranted to evaluate impacts to sensitive and threatened species.

The Air District reviewed the analysis in light of these comments, and found that the characterization of the habitats as forest rather than grassland actually resulted in a conservative *over*-estimation of potential deposition in those areas: The maximum amount of deposition in Redwood Regional Park would be slightly reduced to 0.0222 kilograms per hectare per year (kg/ha-yr) (from 0.0223 kg/ha-yr), had the commenter's recommended characterization been used instead; for Garin Regional Park, the maximum amount of deposition would be reduced to 0.3205 kg/ha-hr (from 0.3208 kg/ha-yr).³⁴³ The Air District therefore disagrees that the outcome of the analysis would be any different regardless of how these areas are characterized. Furthermore, the Air District disagrees with the comments that computer modeling in general, or the modeling done for this analysis, are inappropriate methods for reviewing the potential for impacts to soils and vegetation. Computer modeling is a well-accepted method for determining what ambient air quality concentrations could result from emissions of air pollutants from sources such as this one. Those resulting ambient concentrations can then be compared with scientific literature about what ambient levels could lead to adverse impacts. In this manner, the analysis can predict what the "real world" impacts of the project will be. In fact, the analysis intentionally overestimates what the "real world" impacts will be in order to err on the side of conservatism, for example by assuming that all NO_x and ammonia emitted will be converted into depositional nitrogen (nitric acid), without considering any of the complex chemical reactions that impact conversion rates. To the extent that these conservative overestimations depart from "real world" conditions, that is fully appropriate for an analysis such as this one.

Finally the Air District also received comments stating that instead of using computer models, actual deposition levels should have been measured within the marshland at Hayward Regional Shoreline to determine whether the proposed project's contribution of nitrogen would bring the total nitrogen load to critical levels involving impact. The comments also alleged that the analysis had failed to consider the importance of deposition to the freshwater ponds in which the tiger salamander breeds. In response to these comments, the Air District disagrees that there is any indication that nitrogen deposition would have any impact to soils or vegetation related to tiger salamander habitat. As noted above, the analysis found that potential deposition will be

any other specific potential impact that the Air District should have included in the analysis, and the District is not aware of any.

³⁴³ Compare Nitrogen Deposition Analysis, *supra* note 340, Attachment A at p. 11, Table 1, with Memorandum, Gregory Darwin, Atmospheric Dynamics, Inc., to Barbara McBride, Calpine, "RCEC Nitrogen Deposition Modeling", April 13, 2009.

more than ten times below the lowest threshold at which the scientific literature indicates even limited invasion may occur; and when a less conservative modeling approach was used to better reflect actual atmospheric transformation of combustion emissions into depositional nitrogen, the results showed deposition rates more than one hundred times below that threshold. In light of this evidence, the Air District does not find any reason to conclude that there may be impacts that could adversely impact tiger salamander habitat, and the commenter has not cited any evidence beyond mere speculation. Moreover, the Air District's conclusion is further supported by EPA's Endangered Species Act consultation, in which the U.S. Fish & Wildlife Service concluded that the increase in nitrogen deposition from the facility "appears to be insignificant and in some places of concern (Hayward shoreline), discountable"³⁴⁴; and that the facility "is not likely to adversely affect federally listed species"³⁴⁵

For all of these reasons, the Air District disagrees that its soils and vegetation analysis did not adequately address nitrogen deposition issues, and disagrees that there could be a significant adverse impact in this area from the facility's emissions.³⁴⁶

Comment XIII.C.4. – Analysis of Potential Impacts to Wildlife:

The Air District also received comments claiming that it did not undertake any analysis of impacts to special status wildlife in the salt marsh, mud flats, and other wetland communities at the Hayward Regional Shoreline. These comments claimed that the Air District has an obligation in the PSD Permit to establish that the facility will have no significant impacts from air emissions to the sensitive wetlands communities adjacent to the shoreline. The comments also claimed that the District failed to evaluate sensitive receptors such as small mammals and birds in the adjacent marsh. The commenter also claimed that the Health Risk Assessment aimed at potential health impacts to humans cannot be extrapolated to small birds and mammals; claimed that impacts on plants in these animals' food supply could harm them; and claimed that some toxics can bioaccumulate.

Response: Although potential impacts to wildlife are very important resource considerations, they are addressed primarily through other regulatory mechanisms such as the Endangered Species Act and CEQA, not through the Federal PSD regulations. Looking specifically at the requirements of the Federal PSD regulations, they address only impacts to soils and vegetation. The Air District has evaluated the potential for such impacts as explained in its soils and vegetation analysis and has found that there will not be any significant soils and vegetation

³⁴⁴ Maurer Nitrogen Deposition Assessment, *supra* note 341, at p. 4.

³⁴⁵ USFWS ESA Consultation Letter, *supra* note 341, at p. 1.

³⁴⁶ One comment also cited concerns about acid rain impacts from the facility, but did not provide any data or information to suggest that any of the PSD-regulated emissions from the facility that the Air District evaluated would contribute to any significant acid rain impacts. The Air District does not believe that there will be any such impacts, as the studies the District used in its soils and vegetation impacts analysis did not show any impacts to soils and vegetation – from acid rain or otherwise – at ambient air quality levels that will result from the facility's emissions. The Air District also notes that EPA and the Fish & Wildlife Service did not find any potential significant adverse acid rain impacts when they conducted their endangered species impacts analysis.

impacts as a result of air emissions from the facility. Soils and vegetation issues can often be related to wildlife issues because soils and vegetation provide habitat and food for wildlife, and so to the extent that there is such a connection here, the Air District's findings of no significant impact on soils and vegetation would support a finding of no significant impacts on wildlife, either.³⁴⁷ Moreover, EPA Region 9 and the US Fish and Wildlife Service have evaluated the potential for wildlife impacts in more detail and have concluded that the facility is not likely to adversely affect any endangered species, which further supports the Air District's conclusion on this point.³⁴⁸

Comment XIII.C.5. – Analysis of Impacts To Aquatic Soils & Vegetation Resources:

The Air District also received comments directed specifically at aquatic resources. The comments suggested that the Air District's analysis has not adequately evaluated the potential for impacts to adjacent or nearby vernal pools, salt marsh areas, and other important soils and vegetation resources in the Hayward Shoreline area. Some comments suggested that heat discharges from the facility could promote the growth of certain marshland and bay-water organisms, which might adversely impact aquatic solids and vegetation and the local ecosystem in general, which could also cause secondary and tertiary impacts upon local air quality. These comments noted that the portion of the San Francisco Bay located near the project site is relatively static in nature and could therefore experience a permanent temperature increase as a result of the facility.

Response: The Air District's soils and vegetation analysis covered all types of soils and vegetation resources, including aquatic vegetation. The analysis specifically identifies a number of aquatic resources, including coastal habitats along the eastern shore of the San Francisco Bay such as salt marshes, brackish/freshwater marshes, brackish sloughs, evaporation ponds, and a creek. The Air District therefore disagrees that its assessment did not appropriately cover

³⁴⁷ The Air District also received a communication outside of the comment periods stating that it should take into account the potential for CO₂ concentrations to increase air quality impacts by elevating ozone and particulate matter levels based on the recent research published by Dr. Mark Z. Jacobson (as described earlier in Section XIII.B regarding the PM_{2.5} Source Impact Analysis). This communication cited several animal species that it claimed should be analyzed. This communication is not a formal comment on the record that the Air District is obligated to respond to. But given the public interest in wildlife issues and in the impact of Dr. Jacobson's research paper on this project, the Air District addresses this issue in order to provide the public with the best information possible about the project. As noted above in Section XIII.B., Dr. Jacobson's work is relatively recent and the Air District is wary of incorporating it into its numerical modeling programs for specific projects at this point. But even taking Dr. Jacobson's most conservative and highest predicted impact on ozone and particulate matter levels, the increase in predicted impacts would be only a 0.8% increase in modeled impacts. Given that the modeled concentrations of these pollutants are orders of magnitude below the levels at which adverse soils and vegetation impacts could start to occur, the Air District disagrees that Dr. Jacobson's calculations, even if conservatively applied here, would predict any adverse soils or vegetation impacts or any adverse effect on any species habitat.

³⁴⁸ See EPA ESA Consultation Letter, *supra* note 341; USFWS ESA Consultation Letter, *supra* note 341.

aquatic habitats, vegetation, and other resources. Moreover, although these comments claim that the analysis was inadequate in this respect, they do not point to any specific aquatic resource that they claim would be adversely impacted by the emissions from this facility. The Air District therefore finds nothing in these comments that provides any reason to question the conclusion that the facility will not have any significant adverse impacts on any soils and vegetation resources, including aquatic resources.

With respect to adverse impacts to aquatic soils and vegetation resources from heat discharges from the facility, the facility will actually mitigate any potential warming of the San Francisco Bay from wastewater discharges. This is because the facility will recycle up to 4 million gallons per day of treated wastewater from the City of Hayward's wastewater treatment plant for cooling water, which would otherwise be discharged into the Bay. This wastewater, which the City currently discharges into the Bay, has a temperature of between 68°F and 72 °F, which is warmer than the ambient Bay temperature.³⁴⁹ By eliminating this discharge to the Bay, the project would actually mitigate any potential Bay warming, not exacerbate it. Moreover, the project itself will not discharge any cooling water or wastewater into the Bay. The project will not use "once-through cooling" – the practice of drawing cooling water from the Bay or other body of water and then discharging the heated effluent back into the same body of water – as has been used at some older power plants in California. Instead, the facility will use cooling water from the City of Hayward's wastewater treatment plant, as noted above, and will use a zero liquid discharge system that evaporates that cooling water and does not discharge anything into the Bay. For these reasons, the Air District disagrees that there will be any negative impacts on warming of the Bay.

Comment XIII.C.6. – Compliance With NAAQS as Evidence of No Adverse Impacts:

The Air District received comments criticizing it for allegedly relying on compliance with the National Ambient Air Quality Standards as evidence that there would be no adverse impacts on soils and vegetation. The commenter claimed that this approach is contradictory to the approach taken with respect to the Metcalf facility.

Response: EPA has recognized that, in general, ambient air that is in compliance with the NAAQS will not have any adverse impacts on soils and vegetation.³⁵⁰ Moreover, the EAB has held that in many cases, simply relying on the NAAQS (in conjunction with an ESA finding of no impact) is adequate.³⁵¹ In accordance with these authorities, this was the approach the District initially took with respect to soils and vegetation for the Federal PSD Permit in the February 7, 2007 Air Quality Impact Analysis the commenters cited (*see* pp. 154-160 of the December 8, 2008 Statement of Basis).

³⁴⁹ *See* Daily records from City of Hayward Wastewater Treatment Plant, December 2008 through March 2009.

³⁵⁰ *See* NSR Workshop Manual at pp. D.4-D.5. ("For most types of soil and vegetation, ambient concentrations of criteria pollutants below the secondary national ambient air quality standards (NAAQS) will not result in harmful effects.")

³⁵¹ *See In re Kawaihae Cogeneration Project*, 7 E.A.D. 107, 130 n. 33 (EAB 1997).

That said, in many cases additional investigation and analysis is warranted to ensure that there would be no soils and vegetation impacts at levels even below the NAAQS. That is what the Air District did in this case upon remand when members of the public raised concerns about soils and vegetation impacts. To that end, the Air District prepared a very detailed analysis of potential soils and vegetation impacts using studies that examined ambient air pollution levels at which plant impacts can be observed.³⁵² This analysis showed that the facility will not cause any significant adverse impacts to soils and vegetation. The Air District therefore agrees with this comment to the extent that the comment suggests that further analysis beyond simply looking to NAAQS compliance is warranted here. The Air District disagrees with the comment, however, to the extent that it suggests that the facility will have adverse soils and vegetation impacts or that the Air District's analysis in this respect was somehow deficient.

Comment XIII.C.7. – Air Quality Impact Analysis Public Review Process:

The Air District also received comments complaining about the process that was used to develop and air quality impact analysis, and in particular the soils and vegetation analysis. The commenter claimed that no public meeting was held to review the air quality impacts to the sensitive wetlands at the Hayward Regional Shoreline, in contrast to what was provided for the Metcalf Energy Center, another power plant project. The comments also claimed that there has never been an analysis of the air quality impacts to sensitive resources on the Hayward Shoreline, and no mitigation of the project's emissions, because the CEC refused to re-open its environmental review and the District has not undertaken one.

Response: The Air District disagrees with these comments. The Air District provided a full public review process on its soils and vegetation analysis as part of the public review process for the entire permit. The Air District also held a public hearing in Hayward as a part of this public review process. This process was at least as robust, if not more robust, than the process that the Air District provided for the Federal PSD Permit for the Metcalf Energy Center. With respect to the CEC's environmental review, the Air District disagrees that the analysis failed to address sensitive resources or to provide mitigation for air quality impacts. Complaints about the CEC's process, however, should be directed to that agency and are not part of the PSD permit analysis.

Comment XIII.C.8. – Use of Soils & Vegetation Analysis Guidance Documents:

The Air District also received comments claiming that its soils and vegetation analysis is not consistent with guidance documents from several agencies on how to assess soils and vegetation impacts. These comments suggested that the Air District should redo its analysis consistent with current guidance.

Response: The Air District followed the approach suggested by the most current and authoritative EPA guidance that it is aware of, the 1990 NSR Workshop Manual. While not binding on the Air District, the NSR Workshop Manual has been widely accepted among permitting agencies as providing a sound method for addressing PSD issues, and its use has been approved by the Environmental Appeals Board. The Air District therefore disagrees that it has not properly followed appropriate guidance in conducting its soils and vegetation analysis. To

³⁵² See Statement of Basis, Appendix C, Soils & Vegetation Analysis, pp. 90-93; see also Additional Statement of Basis at pp. 89-91.

the extent that anything in any of the guidance documents referred to in the comments is inconsistent with the Air District's methodologies, the Air District declines to follow that guidance and finds it more appropriate to use the methodology established in the NSR Workshop Manual.

Comment XIII.C.9. – Use of 1980 EPA Screening Procedure:

The Air District received comments criticizing its use of EPA's 1980 screening procedure for soils and vegetation impacts.

Response: The Air District agrees that a soils and vegetation impacts analysis should not be based only on passing a EPA 1980 screening procedure review. A complete soils and vegetation analysis should include site-specific information about the specific species present near the project location; an evaluation of the sensitivities of such species to air pollutant exposure; an assessment of the ambient air pollutant concentrations that the facility would cause; and then a comparison of modeled concentrations against the concentrations at which impacts might occur in the species in the vicinity of the project.³⁵³ The Air District did exactly that here, and found that pollutant concentrations resulting from the facility would be well below levels at which impacts might be seen. Beyond this analysis, however, comparison with the EPA's 1980 screening procedure levels is not inappropriate as an additional tool to ensure that there will be no significant impacts. The Air District conducted this screening review for informational purposes to determine that the facility will not have any significant impacts under this methodology as well.³⁵⁴

Comment XIII.C.10. – Currentness of Reference Materials Relied On:

The Air District also received comments claiming that it should use current reference material for the analysis of potential impacts on soils and vegetation. These comments questioned some of the sources that the Air District relied on in its analysis based on their age.

Response: The Air District disagrees that the sources of information it used are unreliable or inaccurate. The passage of time alone does not make information unreliable, and the Air District is not aware of any new information that would suggest that its analyses were flawed. These comments have not pointed to any area in which the Air District's analysis was defective based

³⁵³ See NSR Workshop Manual, pp. D.4-D.5, D.11-D.12.

³⁵⁴ Some comments also questioned why the Air District used 1-hour average concentrations for its comparison with the 4-hour average NO₂ screening threshold (see Table VI of the Air Quality Impact Assessment, on p. 93 of the initial Statement of Basis). The 4-hour averaging period listed for the NO₂ screening concentration (as well as the 8-hour and 1-month averaging periods) is set forth in the EPA screening procedure. The Air District did not have modeling results based on a 4-hour averaging time period, so it used the 1-hour results that it did have from its modeling. The Air District assumed that the maximum 1-hour average results would occur in each of the four hours covered by the 4-hour averaging period for purposes of the comparison with the screening levels. Note that this is a conservative assumption because it would be highly unlikely for the maximum predicted 1-hour average concentrations to occur in each of four successive hours. Nevertheless, despite this conservatism, the comparison still shows that the facility's impacts will be more than 10 times less than the 4-hour screening concentration.

on the sources of information the Air District used, nor have they provided any reason why the analysis should have reached a different conclusion.

Comment XIII.C.11. – Identification of the Facility’s Proximity to Specific Soils & Vegetation Resource Locations:

The Air District received comments questioning whether Don Edwards San Francisco Bay National Wildlife Refuge and the South Bay Salt Pond restoration project are within 1 mile of project (although the comments did not assert that such proximity could affect any aspect of the Federal PSD Permit process). These comments also questioned whether the California Department of Fish & Game (“DFG”), the U.S. Fish & Wildlife Service (“FWS”), and Coastal Conservancy should have been notified about the proximity of the proposed facility to the restoration project. The commenters also asked how far it is from the project location to the San Francisco Bay, and whether the “on-site waterway” is affected by tides (but again not explaining how these questions could affect the permit).

Response: These comments do not raise any issues that affect the outcome of the soils and vegetation analysis. The Air District adequately surveyed the soils and vegetation conditions in the vicinity of the project location and considered the potential for adverse impacts from the facility’s emissions. Moreover, the Air District properly notified the public and all required agencies of its permit proceeding. These comments do not provide any reason why any element of the soils and vegetation analysis was inadequate, and the Air District is not aware of any.

Comment XIII.C.12. – Analysis of Potential for Impacts to Lichens:

The Air District received comments suggested that the District should include lichens in its soils & vegetation analysis. The comments specifically noted a screening level for SO₂ impacts of 13 µg/m³ based upon a study of certain types of Alaska lichens.

Response: No biological survey has identified the presence of lichens as a species of concern, and the comments did not point to any evidence or studies that do so either. Moreover, to the extent that there are any lichens in the vicinity of the project, it is unlikely that the project’s emissions would have any significant impact on them given the findings of the Air District’s analysis showing that the facility’s emissions will be orders of magnitude less than the levels at which impacts to plants could occur. (The Air District notes that the commenters quote a study finding that “visible injury symptoms occur at lower doses in crops and conifers than in lichens.”) The Air District therefore has no reason to believe that there could be any significant impact to lichens from the proposed facility. With respect to a 13 µg/m³ screening threshold for SO₂ impacts, this facility will not have SO₂ emissions above the PSD significance threshold and no soils and vegetation analysis for SO₂ emissions is required.

Comment XIII.C.13. – Photosynthetic Generation of Oxygen By Plants:

The Air District also received a comment stating in its initial Statement of Basis the Air District stated that plants metabolize and produce carbon monoxide, whereas in fact they actually produce oxygen.

Response: In response, the Air District agrees that plants produce oxygen, but they also can metabolize and produce carbon monoxide in addition to their other metabolic processes.³⁵⁵ But none of the Air District’s analysis was based on a finding that plants produce carbon monoxide, so this issue is ultimately moot.

D. “Associated Growth” And “Secondary Emissions” Analyses

The Air District also received comments questioning its assessment of secondary emissions and its associated growth analysis performed as part of the AQIA, which the Air District addressed at pages 16 and 93-94 of the Statement of Basis and additionally at pages 91-92 of the Additional Statement of Basis. The Air District responds to these comments here.

As a general introduction regarding these comments, the Air District notes that there are two independent concepts at issue. One is “secondary emissions” associated with the facility, which are emissions that are not from the facility itself but arise from some other related source that would not be constructed or operated but for construction of the facility under review. Secondary emissions do not include emissions from any facility that would be constructed for some reason other than construction of the facility under review. Moreover, secondary emissions include only emissions from a related facility that are (i) specific, (ii) well-defined, (iii) quantifiable, and (iv) impact the same general area as the stationary source. A paradigm example would be emissions from a quarry owned by a cement company that supplies aggregate to a cement plant. If the company needs to double the size of its quarry operation in order to double the capacity of its cement plant, the increased emissions from the quarry would be “secondary emissions” for purposes of PSD review. If the cement plant expansion triggered PSD review, the PSD review would have to consider the increased quarry emissions as “secondary emissions” directly resulting from the increased capacity of the cement plant.³⁵⁶ Only specific emissions such as this that are directly associated with the facility under review are considered as “secondary emissions”. Notably, mobile source emissions are generally excluded from “secondary emissions” subject to PSD consideration.

The other concept involved here is “associated growth”. The PSD regulations require that permitting agencies include any general commercial, residential, industrial or other growth associated with the source in the Additional Impacts Analysis.³⁵⁷ Such growth includes expansion of existing infrastructure necessary to support the operation of the facility under review, such as additional growth in industries necessary to provide goods and services the facility will need to operate (*e.g.*, the production of raw materials, the development of maintenance facilities, *etc.*), additional growth in residential development and related infrastructure (*e.g.*, schools, shopping facilities, *etc.*), and other similar types of support

³⁵⁵ Air Quality Criteria for Carbon Monoxide, EPA 600/P-99/001F June 2000, page 1-1 (available at www.epa.gov/NCEA/pdfs/coaqcd.pdf).

³⁵⁶ See 40 C.F.R. § 52.21(b)(18) (regulatory definition of “secondary emissions”); NSR Workshop Manual at § A.II.B.4, pp. A.16-18, (discussing the “secondary emissions” requirements).

³⁵⁷ See 40 C.F.R. § 52.21(o)(1), (2).

infrastructure. Again, mobile source emissions such as emissions from cars and trucks are excluded from this review.³⁵⁸

With these general concepts in mind, the Air District addresses the specific comments it has received in these areas.

Comment XIII.D.1. – Emissions Associated With Project Workforce:

The Air District received comments questioning whether there might be emissions from associated growth related to temporary and permanent workers at the site, for example in the form of transportation emissions generated through commuting.

Response: With respect to emissions from the workforce that will be associated with the project, the Air District disagrees that there will be any secondary emissions or associated growth resulting from the need for workers at the facility, as those terms are defined for purposes of the PSD permitting analyses. The comments have not identified any new facilities that will need to be constructed in addition to the proposed facility in order to accommodate workers at the site, and certainly have not pointed to any specific, well-defined, and quantifiable emissions that would occur as a direct result of this facility. Furthermore, the need for workers for the project will not cause any significant associated growth because they will come from the existing workforce, which is more than adequate to meet the facility's needs. The comments did not suggest that this conclusion that the facility's jobs will adequately be supplied from Bay Area's workforce was incorrect. As the project will not cause any significant increase in the size of the workforce in the Bay Area, there will not be any need for any significant expansion of associated infrastructure such as housing or other infrastructure that would constitute "associated growth". To the extent that workers will have to commute to the facility to do their jobs, which may entail transportation emissions, mobile source emissions associated with employee commuting are not generally included in a source impact analysis, as noted above. Furthermore, even if transportation emissions were subject to review, there will not be any significant *increase* in emissions from the project since it will draw workers from the existing workforce, who are already living and driving in the Bay Area.

Comment XIII.D.2. – Potential for New Growth and Development That May Use Electricity From The Facility:

The Air District also received comments suggesting that the new electrical generating capability provided by the facility may cause associated growth and the development, and that the District should take into account the air emissions from such growth. The comments similarly claimed that the District did not properly take into account associated negative growth in sustainable electrical generation.

Response: With respect to the new electrical generating capacity that the project will provide, it is speculative whether this new capacity will be a cause of any significant growth in the region. Some of it may be used to take the place of older generating capacity that is being taken off-line, and even if it does provide some overall expansion of the region's total electric generating capacity there is no indication that this would cause any new development. It is unlikely that any

³⁵⁸ See generally NSR Workshop Manual at § D.II.A., pp. D.3.-D.4.

new growth or development will occur simply because of the existence of excess electrical generating capacity, as opposed to some other independent reason.

The Air District published this further analysis in the Additional Statement of Basis. The Air District subsequently received comments during the second comment period that questioned the District's statements that it would be speculative to predict that the electrical generating capacity that would be provided by the Russell City facility would cause new induced growth or development. These further comments claimed that it is clear that areas without electricity do not tend to grow and that areas with excess capacity tend to grow. The commenters stated that the Air District should therefore conduct a growth analysis to take into account growth that would be induced the power provided by the new facility.

In response to these further comments, the Air District reiterates that speculation regarding whether the facility's electrical generating capacity will directly cause any new growth development does not constitute "secondary emissions" or "associated growth" as those concepts are used in the PSD permitting analysis. Such speculation does not identify any specific new facilities that would not be constructed but for the construction of this power plant. Moreover, generalized speculation that new growth may occur in the future that will use electricity from this facility does not identify any specific, well-defined, and quantifiable emissions increases in the vicinity of this facility of the type that are considered "secondary emissions". And such speculation does not identify any new infrastructure that would be required to serve the facility of the type that could be considered "associated growth". For all of these reasons, the Air District continues to disagree with the commenters' assertions that there may be new growth or development that may use electric power generated by this facility; or that the Air District needs to conduct an analysis of any potential for new growth or potential air quality impacts that could be associated with it.

Comment XIII.D.3. – Wastewater Treatment Plant Expansion:

The Air District also received comments claiming that the project has already generated secondary growth in the form of an expanded local water treatment plant, the capacity of which was increased to provide cooling water for the project.³⁵⁹

Response: This comment appears to be based on a misconception regarding the proposed facility's relationship with the City of Hayward's wastewater treatment plant. The proposed facility has been designed to handle wastewater from the treatment plant and use it as cooling water. The wastewater treatment plant will not handle wastewater from the proposed facility. This will be an environmentally beneficial aspect of the facility in that it will obviate the need for the City of Hayward to discharge its wastewater into the Bay (although this aspect of the project has no direct relationship with air quality). The project will require a new tertiary treatment

³⁵⁹ These comments also cited the Eastshore project, an unrelated power plant project that was not approved by the CEC, as evidence for the proposition that once a high impact project has been approved for an area, it paves the way for other similar projects. The Air District disagrees that this speculation that additional facilities may be located near this project provides any reason to conclude that there may be specific secondary emissions or associated growth that the Air District needs to analyze regarding this PSD permit.

plant to treat the wastewater from the wastewater treatment plant in order to make it clean enough to use in the facility's cooling system (which is a direct part of the facility itself, not construction of a secondary facility), but it will not involve any expansion to the capacity of the wastewater treatment plant. The District is unaware of any other relevant changes that have been made to the wastewater treatment plant, and in particular of any changes that may impact air quality. The Air District published this explanation in the Additional Statement of Basis and invited members of the public to comment further if they were aware of any increases in air emissions from any expansion with respect to the wastewater treatment plant as a result of this project, but did not receive any further comments on this issue during the second comment period. For all of these reasons, the Air District disagrees that there will be any secondary emissions or associated growth with respect to the wastewater treatment plant that the District needs to evaluate in connection with this Federal PSD permit.

XIV. HEALTH RISK ASSESSMENT ISSUES

The Air District also received several comments regarding the Health Risk Assessment it prepared for the facility. The Health Risk Assessment is performed as a requirement of the Air District's state-law regulations, and it is therefore not directly a part of the PSD Permit evaluation, as the Environmental Appeals Board explained in its Remand Order for this permit (*see* Slip Op. at p. 41). The Air District is responding to these comments here, however, for two reasons. First, the Air District considers a facility's potential for health risks to be an important topic of public interest that it wants to inform the public about. Second, the Air District is also responding to the extent that these issues may be tangentially related to PSD issues in that the Air District has relied on an assessment of health risks in connection with PSD-related analyses such as considerations of ancillary environmental effects of various BACT control alternatives and considerations of potential impacts to Environmental Justice communities. The Air District therefore presents these responses to the comments it received on its Health Risk Assessment.

Comment XIV.1. – Methodology Used in Health Risk Assessment:

The Air District received comments questioning the Health Risk Assessment methodology it used, and in particular whether it is appropriate for use in federal PSD Permitting. Some comments suggested that the Health Risk Assessment methodology may not take into account segments of the population with heightened sensitivities. One comment also questioned why health impacts with a hazard index of less than 1 are not significant. Another comment criticized the District's methodology for assessing risk with respect to morbidity, and claimed that the District should consider mortality instead.

Response: In response to these comments, the Air District notes at the outset that the PSD permitting requirements do not directly require a Health Risk Assessment to be performed at all. *See* 40 C.F.R. section 52.21. PSD permitting does tangentially involve the District's Health Risk Assessment in areas like the BACT comparison of alternative control technologies, which can involve an assessment of collateral environmental impacts such as toxics risk, but EPA does not specify any specific methodology for conducting such an assessment. Instead, EPA allows permitting agencies to use whatever methodology is most appropriate.³⁶⁰ The Air District uses the methodology developed by California's Office of Environmental Health Hazard Assessment ("OEHHA"), which is highly appropriate for this purpose and is designed to account for sensitive populations.³⁶¹

With respect to why a hazard index of less than one is not significant, a hazard index below one means that the toxic exposure is less than the "Reference Exposure Level", which is a level developed by health professionals as an indicator of potential adverse health impacts. The

³⁶⁰ *See In re J&L Specialty Products Corp.*, 5 E.A.D. 31, 81 (EAB 1994) ("It is entirely reasonable for the Region, in the exercise of its discretion, to give credence to State policy and guidance documents in effect under State law at the time of permit issuance.").

³⁶¹ In particular, the issue of including acrolein in the Health Risk Assessment was raised in connection with the OEHHA methodology the Air District used. The EAB Remand Order in this case specifically directed that this is not an issue that needs to be considered in the PSD permitting analysis (*see* Remand Order at p. 41).

hazard index is the sum of the individual hazard quotients for toxic air contaminants identified as affecting the same target organ or organ systems. A hazard quotient is the ratio of the estimated exposure level to the Reference Exposure Level, which is the concentration level at or below which no adverse health effects are anticipated. An exposure below the Reference Exposure Level means that no adverse health effects are anticipated for the exposure duration involved. The Hazard Index measures exposure relative to this Reference Exposure Level; a Hazard Index of less than 1 means that the exposure will be less than the Reference Exposure Level and thus protective of public health.

With respect to considering morbidity instead of mortality in assessing the level of risk, morbidity is an appropriate measure for health risk assessment purposes. Looking at morbidity is actually more conservative in that it captures all potential health problems, not just those that are fatal. That is, morbidity encompasses all potential health effects that could arise from toxic exposures, whereas mortality encompasses only those health effects that might cause death, which is a smaller subset of exposures. The Air District therefore disagrees that the morbidity approach is inappropriate for a health risk analysis.

Comment XIV.2. – Exposure Assumptions for Chronic Risk Assessment:

The Air District received comments stating that the chronic exposure modeling was based on the assumption that chronic exposure to toxic compounds will last one year, which they claimed is inappropriate for a power plant that will likely be in operation for a longer time period.

Response: The Air District agrees that the chronic exposure modeling must assume a long-term exposure scenario, not just one year of exposure. This comment has apparently misunderstood how the Air District conducts its non-carcinogenic chronic health risk assessment, however. For chronic risks, the Health Risk Assessment looks at the annual exposure rate for the maximally exposed individual, and then assumes that the individual will be exposed to this maximum annual exposure rate for the entire year over every year of an assumed 70-year life span. The Health Risk Assessment therefore appropriately captures lifetime risk; it does not assume that exposure occurs for one year and then stops.³⁶² The Air District explained this situation in the Additional Statement of Basis, and did not receive any further comments on this issue during the second comment period.

Comment XIV.3. – Assessment of Cumulative Risks From Project In Conjunction With Other Sources of Toxic Risk:

The Air District received several comments stating that its Health Risk Assessment did not consider cumulative or synergistic effects of exposure to all sources of air pollution including both the proposed facility and other existing sources in the area.

Response: The Air District's Health Risk Assessment methodology does not include an assessment of cumulative risk from project plus existing background sources for several reasons. First, where level of risk from a project is found to be so low that it is below the HRA significance thresholds, the project is not expected to make more than a *de minimis* contribution

³⁶² See Memorandum from Glen Long to Weyman Lee, February 28, 2007, *re* Results of Health Risk Screening Analysis for Russell City Energy Center, at p. 1.

to any cumulative risk. Emissions below these low threshold levels will simply not make any significant additional contribution to the overall cumulative risk, and assessing the facility's addition to the overall cumulative risk burden would therefore add relatively little to the understanding of the cumulative concern. Moreover, undertaking a risk assessment encompassing all emission sources in the region of the facility would require resources that do not exist at this time. There are significant technical difficulties associated with completing a neighborhood-scale cumulative HRA, which are largely related to incompleteness of data (e.g., spatial and temporal emission patterns) needed to estimate exposures and health risks, and to ascertain source contributions. Furthermore, unlike for criteria air pollutants, no standards have been established for health risks associated with cumulative exposure to TACs emitted from all sources, and so it would be difficult to assess at what level additional cumulative impacts would become significant. And finally, cumulative environmental impacts must be assessed for any project in California under CEQA, and so to the extent that cumulative toxic risks have the potential to be significant they can be addressed in that context. For all of these reasons, the Air District's Health Risk Assessment procedures – and the OEHHA methodology on which the District's procedures are based – do not provide for a cumulative analysis that takes into account the facility's impacts in conjunction with existing local background sources. The procedures rely instead on the HRA significance levels to prevent significant additional contributions to cumulative risks.

Comment XIV.4. – Health Risk Assessment for Ammonia Emissions:

Commenters stated that ammonia emissions will be up to 15.2 lb/hr, which they claimed exceeds the acute screening trigger level of 7.1 lb/hr. The commenters claimed that the District should therefore thoroughly analyze potential health impacts from the ammonia emissions.

Response: The comments are correct that ammonia emissions would be above the Health Risk Assessment screening level, and accordingly the Health Risk Assessment did in fact take ammonia emissions into account.³⁶³ The Health Risk Assessment found that the risk from all toxics, including ammonia, was less than significant.

Comment XIV.5. – Legionnaire's Disease:

Commenters suggested that the wet cooling system could involve a risk of causing Legionnaire's disease, and claimed that this potential health risk should be investigated further as part of the Health Risk Analysis. The commenters implied that the use of recycled water from the City of Hayward's wastewater treatment plant could increase the risk of Legionnaire's disease.

Response: The Air District notes that its expertise as a public health agency is primarily in the area of chemical air pollutant and the health problems they can cause, not in medical pathogens. For this reason, the Air District does not address medical concerns such as issues related to Legionnaire's disease in its Health Risk Assessment. To the extent that the proposed project may raise concerns about Legionnaire's disease, those concerns should appropriately be addressed in the broader environmental review context through the Energy Commission's CEQA-equivalent process. Nevertheless, in response to repeated requests that the Air District itself should evaluate the potential for risks regarding Legionnaire's disease, the Air District has

³⁶³ See *id.*

investigated this issue in detail. The Air District has found that there will be not be any significant risk of Legionnaire's disease from the cooling tower emissions because of several safeguards that the project will incorporate. First, the facility will be required under Section 60306 of Title 22 of the California Code of Regulations and by the conditions of its CEC license to treat the cooling tower water with chlorine or other biocide to prevent the growth of the Legionella bacterium and other micro-organisms. The facility will be required to establish a Cooling Water Management Plan incorporating this requirement and following the CEC's "Cooling Water Management Program Guidelines" or with the Cooling Technology Institute's "Best Practices for Control of Legionella" guidelines. The facility will also be required to sample and test for the presence of Legionella bacteria at least every six months.³⁶⁴ The cooling tower will also use a high-efficiency drift eliminators to minimize risks. The Occupational Safety and Health Administration has recognized these measures as appropriately addressing the potential for Legionnaire's disease risks associated with cooling systems of this type.³⁶⁵ With all of these safeguards in place, the Air District has concluded that there will not be any significant risk of Legionnaire's disease outbreaks from this facility.

Comment XIV.6. – Including Startup Emissions In Health Risk Assessment:

The Air District also received comments expressing a concern that Toxic Air Contaminant ("TAC") emissions may be higher during startups. These comments stated that the Air District should assess TAC startup emissions and take them into account in its Health Risk Assessment for the facility.

Response: The Air District has considered Toxic Air Contaminants associated with startups in response to this comment. The Air District obtained information on TAC emissions rates from a source test conducted at the Palomar Energy Center facility during startup operations.³⁶⁶ For TACs that were not measured during that source test, the Air District used the full values of the California Air Toxic Emission Factors ("CATEF") emission factors published by the Air Resources Board, with the assumption that there would be no reduction in emissions as a result of abatement equipment. The Air District then conducted a revised Health Risk Analysis assuming that the facility would operate at these higher startup levels continuously.³⁶⁷ This is obviously a highly conservative assumption, as the facility will not operate in startup mode continuously, but the Air District used the assumption anyway to ensure that the analysis was adequate as a risk screening measure. Using these conservative assumptions, the Health Risk Assessment showed that the highest cancer risk would be 0.72 in one million, the highest chronic non-cancer health risk would be a Hazard Index of 0.0182, and the highest acute non-cancer

³⁶⁴ 2007 Energy Commission Decision, *supra* note 16, at p. 112-13, Conditions of Certification PUBLIC HEALTH-1.

³⁶⁵ See OSHA Technical Manual § III, ch. 7(V).

³⁶⁶ See San Diego Air Pollution Control District, *Carlsbad Energy Center Rule 1200 Health Risk Assessment Report* (Aug. 3, 2009), Appendix B to Carlsbad Energy Center FDOC, *supra* note 134, at pp. 8-10 (summarizing toxics emission factors based on source test at the Palomar Energy Center).

³⁶⁷ The emission levels used are summarized in a Memorandum from Weyman Lee to Glen Long, dated October 2, 2009 (and as further documented in the attachment "Supplemental HRA for cold startup operations).

health risk would be 0.0415.³⁶⁸ All of these risk levels are less than significant, and so the Air District concludes that even if the facility were to operate full-time in startup mode, the TAC emissions would not cause a significant health risk. This conclusion is the same as the conclusion that the Air District reached in the Statement of Basis and Additional Statement of Basis.

Comment XIV.7. – Health Risk Assessment for Aircraft Pilots and Passengers:

The Air District received comments claiming that the Health Risk Assessment should take into account potential health risks to pilots and passengers flying in the vicinity of the proposed facility.

Response: In response to these comments, the Air District has conducted an additional health risk assessment using an air dispersion model to determine emissions impact above ground level (*i.e.*, using a “flagpole receptor”). The maximum potential hazardous air pollutants emission rates were used. Flagpole receptor is defined where persons (pilots and passengers) may be exposed to concentrations above ground level (flight area) of a particular compound or substance. The locations are not necessarily a residence or a location where people actually exist; it may be any offsite above ground level where a person could potentially be present.

The proposed project will have two stacks each having a height of 145 feet above the ground level. The acute hazard index was calculated to be 0.52.³⁶⁹ A value below 1.0 means that the exposure would not cause any adverse health effects. The location of the maximum acute hazard index is very close to the RCEC stacks and is based on one-hour exposure level. This is most likely a conservative assumption, as it is unlikely that that pilots and/or passengers would remain at this location in the airspace for a continuous hour and be exposed to the full extent assumed in the District’s analysis.

The Air District received a comment during the second comment period that aircraft could be exposed to facility exhaust for extended periods of time if they have to circle the airport or if they repeat takeoffs, landings or other maneuvers multiple times for practice or training purposes. But even in this situation, with repeated passes through the facility’s exhaust stream, the aircraft would still not be within the stream continuously and so the exposure assumptions would still be overly conservative. And even if for some reason an aircraft did remain directly within the exhaust stream for a continuous hour, the acute hazard index was well below 1.0, demonstrating that even continuous exposure during that time would not cause any risk of adverse health effects. The Air District also received a comment during the second comment

³⁶⁸ See Memorandum from Glen Long to Weyman Lee, December 14, 2009.

³⁶⁹ See email memorandum from Glen Long, BAAQMD, to Bob Nishimura, BAAQMD, March 12, 2009. Comments noted a discrepancy between a statement by the District in the Additional Statement of Basis that the project will have 150-foot tall stacks and the CEC’s documentation stating that the stacks will be 145 feet tall. These comments are correct that in the discussion of Health Risk Analysis issues in the Additional Statement of Basis, the Air District mis-stated the stack height as 150 feet (*see* Additional Statement of Basis at p. 95). The correct height, and the height that was used in all the modeling analyses for this facility, is 145 feet. (*See, e.g.*, Proposed PSD Permit, condition no. 38, Additional Statement of Basis, p. 109.)

period that the Health Risk Assessment should use a lower exposure threshold for aircraft pilots, crews and passengers than for the general population, given the nature of aircraft operation. The Air District disagrees with this comment. The Reference Exposure Levels on which the Health Risk Assessment analysis is based are already designed to take into account sensitive populations (with an appropriate margin of safety), and there is no reason to conclude that pilots, aircrews, or passengers would experience a risk of adverse health effects where the hazard index is well below 1.0. The Air District therefore disagrees with the suggestions that its Health Risk Assessment with respect to aircraft operations was not appropriate.

Comment XIV.8. – Health Impacts of Fine Particulate Matter:

The Air District received comments citing recent developments in the understanding of the health impacts of fine particulate matter. These comments suggested that the Air District should consider fine particulate matter in its Health Risk Assessment. These comments also claimed that the HRA approach uses a PM₁₀ ‘surrogate’ method to assess risks from fine particulate matter exposure and does not specifically address PM_{2.5} exposure issues.

Response: The District has considered adding fine particulate matter in our permitting procedures. In addition, OEHHA is planning to develop new procedures to address fine particulate matter and to incorporate them into its health risk assessment guidelines that are used by air districts. The District intends to participate in the public process to develop future updates to the risk assessment guidelines and procedures. These guidelines have not been developed at this stage, however, and so the Air District does not have the appropriate tools to include fine particulate matter in its formal Health Risk Assessment. The Air District has addressed fine particulate matter in its PSD Air Quality Impact analysis, however, as detailed above. That analysis found that emissions from the proposed facility would not have any significant contribution to any fine particulate matter pollution in violation of the stringent new National Ambient Air Quality Standards, which are health-protective standards established by EPA.

The Air District discussed this situation in the Additional Statement of Basis and solicited further comments on this issue. In response to the District’s statement that it has not yet developed tools to include fine particulate matter in its formal Health Risk Assessment procedures, commenters stated during the second comment period that the Air District should develop such tools before it processes this permit or should rely on the expertise of someone else who has developed the tools. In response to this further comment, the Air District disagrees that air quality permitting decisions need to be delayed while scientific understanding of PM_{2.5} issues is developing. Recent advances in scientific understanding regarding the health impacts of PM_{2.5} are already reflected in EPA’s recently-updated NAAQS, and in the Clean Air Act’s permitting approaches for ensuring that the ambient air meets the NAAQS. Those permitting requirements – such as the BACT requirement and offsets for major new sources and modifications – as well as the applicable planning requirements that will require further regulatory initiatives going forward – will ensure that the NAAQS are achieved in the Bay Area, even with the permitting of new facilities in the meantime. Moreover, science is always developing and there are always current concerns that are under investigation for which further information and regulatory tools may become available in the future. It would not be reasonable from a policy perspective to put all new development on hold because new scientific understanding is in the process of being developed into enhanced regulatory approaches, as that will always be the case. For all of these

reasons, the Air District disagrees with the comments that it should put off issuing permits until such time as PM_{2.5} can be included in its formal Health Risk Assessment methodology. This is especially true in the case of this facility, which is a natural-gas-fired facility and will emit relatively small amounts of particulate matter.

Comment XIV.9. – Consideration of CO₂ Emissions in Assessing Health Risks:

The Air District received comments stating that the District should take into account the potential for increases in PM and ozone concentrations due to CO₂ emissions when considering the potential health impacts of this facility. These comments were based on the recent research published by Mark Z. Jacobson, which the Air District discussed in Section XIII.B.9. above in connection with its PM_{2.5} Source Impact Analysis. These comments stated that CO₂ emissions from the project will cause increases in death, morbidity, and emergency room visits in addition to the health risks that the District has already analyzed in connection with the proposed permit.

Response: As discussed above in Response to Comment XIII.B.9., regarding impacts of CO₂ concentrations on particulate matter formation, the Air District is following Dr. Jacobson's research but is hesitant to depart from currently-accepted Health Risk Assessment methodologies at this point. However, in response to these comments and the public concerns expressed about the potential for health risks from this facility, the Air District undertook an assessment of what difference it might make in the outcome of the Health Risk Assessment if Dr. Jacobson's findings were incorporated. Dr. Jacobson published estimates of the additional health impacts from all anthropogenic sources of CO₂ based on the Los Angeles area, California and a whole, and for the entire United States. Dr. Jacobson's estimates are summarized in Table 8 below. For the most part, these estimates show that the total impact from all anthropogenic CO₂ sources will be an increase of less than one percent (with a few outliers showing a decrease in the impact or an increase of more than one percent). These are relatively small changes.

Table 8: Summary of Data Published by Dr. Mark Z. Jacobson Regarding Changes In Air Pollution-Related Health Impacts Due To The Effect of CO₂ Emissions³⁷⁰

	California			Los Angeles Area			United States		
	Base Case	Change from CO ₂	% Change	Base Case	Change from CO ₂	% Change	Base Case	Change from CO ₂	% Change
Cancer:									
USEPA	44.1	+0.016	+0.036%	22.0	+0.28	+1.27%	573	+6.9	+1.20%
OEHHA	54.4	-0.038	-0.070%	37.8	+0.39	+1.03%	561	+11.8	+2.10%
Ozone:									
Deaths (high)	6860	+19	+0.28%	2140	+20	+0.93%	52,300	+245	+0.47%
Deaths (med.)	4600	+13	+0.28%	1430	+14	+0.98%	35,100	+166	+0.47%
Deaths (low)	2300	+6	+0.26%	718	+7	+0.97%	17,620	+85	+0.48%
Hosp.	26,300	+65	+0.25%	8270	+75	+0.91%	200,000	+867	+0.43%
ER Visits	23,200	+56	+0.24%	7320	+66	+0.90%	175,000	+721	+0.41%
Particulate Matter:									
Deaths (high)	42,000	+60	+0.14%	16,220	+147	+0.906%	44,800*	+810	+1.8%*
Deaths (med.)	22,500	+39	+0.17%	8500	+81	+0.095%	169,000*	+607	+0.36%*
Deaths (low)	5900	+13	+0.22%	2200	+22	+1%	316,000*	+201	+0.064*

Notes: USEPA = Cancer rates calculated using EPA’s methodologies.
 OEHHA = Cancer rates calculated using OEHHA methodologies
 Deaths (high/med./low) = Predicted additional deaths from increased air pollution formation associated with increased CO₂, based on three varied assumptions of the impact on additional mortality per unit increase in air pollutant concentrations.
 Hosp. = Predicted additional hospitalizations
 ER Visits = Predicted additional emergency room visits.
 *Note that the US particulate matter death numbers are highly suspect because the high estimate is the lowest number and the low estimate is the highest number. In addition, it seems highly unlikely that there could be 42,000 particulate-related deaths in California but only an additional 2,800 throughout the rest of the entire United States. This apparent oversight may be the result of the fact that Dr. Jacobson’s paper has not at this point been peer-reviewed.

Moreover, these are the estimated impacts predicted for all anthropogenic CO₂ sources. If one were to break out only this facility’s CO₂ emissions from all other anthropogenic sources, the impacts would be even lower. The Air District therefore disagrees that Dr. Jacobson’s research gives any reason to revisit the Air District’s conclusion that the air emissions from this facility will not have any significant health impacts.

³⁷⁰ Source: Jacobson Paper, *supra* note 35, at p. 12, Figure.

XV. ENVIRONMENTAL JUSTICE ISSUES

Comment XV.1. – Demographics of Project Location:

The Air District received several comments regarding environmental justice issues. Comments stated that there are areas near the proposed facility with low-income and minority residents, employees and students, and claimed that the project disparately places environmental burdens on them. Some comments also referenced an Environmental Justice analysis undertaken by the CEC that found that the area is ‘majority-minority’.

Response: The Air District is aware of the CEC’s analysis regarding the demographic makeup in areas near the project site, and acknowledges the other information cited by the commenters regarding the demographic makeup of the area surrounding the proposed facility. The Air District does not disagree with this assessment. But the Air District’s conclusion that there will be no disproportionate adverse impacts on any environmental justice community was not based on an assumption that there are no environmental justice communities near the project site. To the contrary, it was based on the District’s assessment that there will be no significant adverse impacts to any community, regardless of demographic makeup. (*See* Statement of Basis, pp. 65-66.) The Air District continues to believe that there will not be any significant adverse impacts on any community regardless of demographic makeup.

Comment XV.2. – Mitigation Measures and the Local Community:

The Air District received comments questioning whether mitigation measures associated with the project will directly benefit communities located near the project site.

Response: This comment fails to identify a specific PSD requirement or any way where the Air District’s permitting analysis or proposed permit conditions failed to satisfy such a requirement. The Air District therefore does not find anything in this comment that questions or objects to the issuance of the PSD permit or the terms of the permit, and thus does not provide any comment that the Air District needs to consider or respond to in its formal PSD response to comments. Nevertheless, the Air District provides the following response to inform the public to the greatest extent possible regarding this project. The Air District notes that all of the mitigation measures that will be provided regarding this project will benefit nearby communities.³⁷¹ Some of the mitigation measures address regional concerns that address the entire Bay Area, and in that respect they benefit neighboring communities as part of the Bay Area airshed as a whole. Other such measures will have a direct benefit to areas near the proposed facility in particular, for

³⁷¹ By “mitigation measures”, the Air District interprets this comment to refer broadly to all aspects of the project that will reduce or offset potential environmental impacts from the project, including elements such as BACT control technology to reduce emissions, emissions offsets and other measures provided under state law to obtain emissions reductions from existing sources to counterbalance new emissions from this project, and measures required under CEQA to mitigate significant adverse environmental impacts to the greatest extent feasible. These “mitigation measures” go beyond what is required in the PSD analysis, and to the extent that the comments are aimed at non-PSD requirements – such as CEQA mitigation measures – the District notes that they are not relevant to the PSD permit analysis. The Air District nevertheless addresses all environmental mitigation measures to provide as much public information as possible.

example through measures to limit emissions of fine particulate matter that may impact areas around the facility. Other mitigation measures benefit natural resources enjoyed by everyone throughout the Bay Area and beyond, such as water quality in the San Francisco Bay and recreation areas in the vicinity of the facility and in the East Bay hills.

Comment XV.3. – Use of Health Risk Analysis to Evaluate Potential Impacts to Local Residents:

The Air District received comments claiming that District cannot use the same Health Risk Assessment methodology it uses for other projects to assess potential impacts to Environmental Justice communities. These comments claimed that minority populations have specific attributes that make them susceptible to air pollution impacts in unique ways. They claimed that the area around the proposed project location has a disproportionate number of people with diseases such as asthma, chronic lung disease, congestive heart failure and other chronic conditions, as well as higher overall mortality rates. Some comments claimed that students who attend an educational institution a mile to the west of the facility location, some of whom are non-white and some of whom may lack medical insurance coverage, are particularly sensitive to external environmental degradation. Other comments claimed that a 1998 EPA guidance document regarding environmental justice issues in PSD Permitting requires the Air District to define the sensitive receptor analysis to the actual unique circumstances affecting the minority community not a generic definition of sensitive receptor that was utilized by the District and the CEC.

Response: The Air District’s Health Risk Assessment methodology is designed to take sensitive populations, such as those who may be particularly sensitive to air pollution concerns, into account.³⁷² This is an important consideration for all communities, as every community has some members who may have heightened sensitivity to potential airborne health hazards to some extent. The Air District supports its Health Risk Assessment methodology as an appropriate way to characterize the potential health risks associated with the proposed Russell City Energy Center with respect to communities that have members with heightened environmental sensitivities. The Air District has reviewed relevant EPA guidance on this issue and has not found any indication that such a Health Risk Assessment methodology cannot be used in evaluating Environmental Justice considerations.

Comment XV.4. – Cumulative/Synergistic Impacts Analysis:

The Air District also received comments asserting that the District should also have examined the “synergistic effects” of existing pollution sources in the area. These comments asserted that the District should analyze the cumulative impacts of the emissions from the Russell City project in conjunction with existing sources in the area.

Response: The Air District’s Health Risk Assessment methodology addressed cumulative risk concerns by ensuring that new sources such as this one will not make add more than a *de minimis* contribution to any cumulative risk. For the reasons explained above in response to Comment XIV.3. (regarding the District’s Health Risk Assessment methodology), the District’s methodology does not evaluate each specific background source for every new project where the

³⁷² OEHHA’s methodology for deriving health effects values (CPFs and RELs) are protective of public health and account for potential exposure to sensitive populations.

project's risk will be less than the *de minimis* level. For these reasons, the Air District does not currently conduct an evaluation of a project's addition to cumulative health risk in its Health Risk Assessment process. But the District certainly does share the commenters' concerns about air pollution sources in locations with existing elevated background level of toxic air contaminants. The Air District is implementing several initiatives to address these concerns. The Air District's Community Air Risk Evaluation ("CARE") program, for example, is designed to implement mitigation measures – such as grants, guidelines, or regulations – to achieve cleaner air for the public and the environment, with specific focus on heavily-impacted communities. Similarly, the Air District is in the process of adopting "Thresholds of Significance" under the California Environmental Quality Act that will add a heightened level of environmental review and mitigation for new projects located in areas with significant existing sources of toxic risk. These policies, along with the Air District's requirement that no new source of toxic air contaminants may contribute more than a *de minimis* additional amount of toxic risk, will help to address the problems associated with air toxics in impacted communities.

Comment XV.5. – Environmental Justice Outreach:

The Air District received comments asserting that the District should have conducted a broader public outreach regarding environmental justice concerns.

Response: The Air District believes that it has conducted a very robust level of public outreach regarding all aspects of this project, including environmental justice issues. The Air District widely publicized its proposal to issue the Federal PSD permit in the community, and held two public hearings at Hayward City Hall to allow residents to express their views on the proposal. Notably, the Air District went well beyond what is required by the Federal PSD regulations in providing notice to Spanish-speaking populations and in providing a translation service at the public hearing to ensure the broadest possible opportunity for public participation. This level of outreach more than satisfies the requirements for PSD permitting and for consideration of environmental justice issues.

XVI. THE FEDERAL PSD PERMIT EVALUATION AND ISSUANCE PROCESS

Comment XVI.1. – Compliance With PSD Delegation Agreement:

The Air District received comments claiming that EPA has determined that the Air District is not implementing the terms of the Delegation Agreement for issuance of Federal PSD Permits entered into between the Air District and EPA Region IX. Some of the comments alluded to the PSD permitting irregularities in the permitting history for a different PSD facility, the Gateway Generating Station. These comments suggested that the Air District should relinquish the delegation of PSD permitting authority back to EPA Region 9.

Response: The Air District disagrees with the assertion that it is not appropriately implementing the terms of the Delegation Agreement. To the contrary, the Air District is following the letter and spirit of the Delegation Agreement, as well as the requirements of 40 C.F.R. section 52.21 as required by the Delegation Agreement. The Air District further disagrees that it should not be taking the lead in processing PSD permits in the Bay Area under the Delegation Agreement.

Historically, the Air District interpreted the provision in the Delegation Agreement stating that permits issued in accordance with the provisions of District Regulation 2, Rule 2, are deemed to meet the Federal PSD permit requirements to mean that if the Air District followed its procedures for issuing District Authorities to Construct under Regulation 2, Rule 2, that it would satisfy the requirements of 40 C.F.R. section 52.21 as well. When the Federal PSD Permit for this facility was appealed, however, it became clear that this was not a legally tenable position and that the District would have to comply with all of the specific requirements of Section 52.21 and related authorities. The Air District has therefore corrected the defects in its PSD permitting procedures and is now following all applicable requirements to the letter, as required by the Delegation Agreement.

With respect to the Gateway Generating Station, after receiving the remand in this case the Air District examined the permitting record of other PSD facilities and discovered the irregularities in the permitting record for that facility. The Air District brought these irregularities to the attention of EPA Region 9 when they came to light, as the District is required to do under the Delegation Agreement, and EPA Region 9 determined that the facility had been built without a valid Federal PSD Permit. EPA Region 9 is currently engaged in an enforcement action regarding these claims. The Air District disagrees that anything in the history of the Gateway facility suggests that it is not properly implementing the Delegation Agreement. To the contrary, the experience with Gateway shows that the Air District has been following the requirements of the Delegation Agreement, initially under the interpretation that EPA was instructing the District to follow District Regulation 2, Rule 2 in issuing PSD permits, and more recently under the interpretation that it must follow the specific requirements of 40 C.F.R. section 52.21.

The Air District therefore disagrees with these comments that it is not properly implementing the Delegation Agreement. Furthermore, the Air District disagrees that there is any reason to give back the delegation of authority to EPA Region 9, either because of the EAB remand or for any other reason. Notably, the EAB's remand ordered the District to re-issue the Draft PSD Permit under delegated authority from EPA after remedying the defects identified in the Remand Order,

and therefore implicitly affirmed the validity of the Delegation Agreement notwithstanding the defects the EAB identified and which have now been corrected.³⁷³

Comment XVI.2. – Compliance with EAB Remand Order:

The Air District received comments questioning whether this Federal PSD Permit application is being processed consistent with the EAB’s Remand Order.

Response: In posing this question, the comments did not claim that the District is failing to process this permit application consistently with the Remand Order, and did not suggest that the District should be doing anything differently in order to comply with the requirements of the Remand Order. The question therefore does not contain a substantive comment for the District to respond to. Nevertheless, to the extent that this question was meant to imply that the District is not complying with the Remand Order, the District has reviewed its procedures generally to ensure that they are following the requirements of the Remand Order, and has concluded that the re-noticing and issuance of the Federal PSD Permit is fully consistent with the Remand Order.

Comment XVI.3. – Compliance with NSR Workshop Manual:

The Air District received comments noting that the District relied on EPA’s 1990 NSR Workshop Manual as guidance for conducting its top-down BACT analyses. These comments questioned if the permit would differ if the District had applied what the comments referred to as present standards, which may have been intended to imply that the 1990 guidance document is somehow out of date.

Response: The Environmental Appeals Board has repeatedly affirmed the importance of the NSR Workshop Manual as valuable guidance for conducting a Federal PSD Permit analysis, including recently in *In re: Christian County Generation, LLC*, PSD Appeal No. 07-01 (EAB Jan. 28, 2008). The comments did not cite any area in which the Air District has relied on something in the NSR Workshop Manual that is out of date or has been superseded, and the Air District is not aware of any. The Air District therefore disagrees with this comment to the extent it was intended to imply that the Air District impermissibly relied on the NSR Workshop Manual.

Comment XVI.4. – Time Period for Processing Permit Application:

The Air District received comments claiming that the permit application for this facility was not processed in compliance with elements of 40 C.F.R. section 51.166, which requires (*inter alia*) that State Implementation Plans that incorporate PSD permitting programs include provisions requiring the state to make a final determination on PSD Permit applications within 1 year after receipt of a complete application. The comments implied that the Air District had not complied with applicable time limits for processing this permit application. The Air District also received some comments that cited various regulatory provisions establishing permitting timelines for power plant approvals (although these other comments did not expressly state that the Air District’s actions were deficient in any way).³⁷⁴

³⁷³ See Remand Order at p. 42.

³⁷⁴ These provisions included California Public Resources Code 25519(h), which provides that local agencies have 180 days to comment on an application for certification; District Regulation

Response: At the outset, the District notes that 40 C.F.R. section 51.166, the regulatory provision cited in these comments, sets forth requirements for state PSD programs to be approved by EPA into Clean Air Act State Implementation Plans. It does not apply to states issuing Federal PSD Programs on EPA's behalf under delegated federal authority. PSD permits issued under delegation of authority from EPA are subject to 40 C.F.R. section 52.21, not 40 C.F.R. section 51.166.

The District's NSR regulations governing District Authorities to Construct do incorporate by reference to the provisions of 40 C.F.R. section 51.166. But to the extent that this makes 40 C.F.R. section 51.166 applicable to the District's NSR permitting program, the District's program does fully comply with the requirements cited in the comments regarding making permit decisions within one year. (*See* District Regulation 2-2-407 & 2-3-405.)

Furthermore, to the extent that there was a one-year time clock for the Air District to make a final determination on the permit application here, the District did make a final determination here within one year after receipt of a complete application. The application was originally received by the District on November 28, 2006 (and was not accepted as complete until some time later),³⁷⁵ and the Air District took final action to issue the Federal PSD permit on November 1, 2007. The Environmental Appeals Board subsequently remanded the permit to the Air District to reconsider its determination, which is why the permit is still before the Air District for decision, but that does not change the fact that the Air District did in fact take final action to issue the permit within one year after the application was submitted. And in the Remand Order the EAB instructed the Air District to undertake further proceedings to reconsider the determination it had made. The EAB did not instruct the Air District to reject the application because more than one year had past since the application was submitted.

Moreover, even if such a one-year requirement was applicable here and the Air District had failed to take action within a year, the remedy for any such delay would be to require the agency to make its determination as soon as possible. It would have no impact on the substance of the determination or on any conditions of the permit. For all of these reasons, the Air District finds

2-3-403, which states that the District should make its Preliminary Determination of Compliance within 180 days after acceptance of a complete application; District Regulation 2-1-405 which states that the District should make its Final Determination of Compliance within 240 days after acceptance of a complete application; and CEC Regulation 1744.5, which also says that the District should make its Final Determination of Compliance within 240 days.

³⁷⁵ A comment stated that the index of permitting documents that the District prepared for this project shows that Application 15487 for this facility was received in May of 2001. The Air District reviewed the index and did not find any reference to District Application 15487 having been received in May of 2001. The commenter may be confusing this application with an earlier application to the CEC for the original project, which is dated on the index May 2001, but that was not the District application for the current project. To the extent that the District made any indication that the application for the Federal PSD Permit the District is now issuing was submitted in 2001, that indication is in error.

nothing in this comment that has any impact on the proposed Federal PSD permit or the conditions therein.

Comment XVI.5. – Discretion to Deny Permit For Project That Satisfies All Requirements For PSD Permitting:

The Air District also received comments suggesting that the District has the discretion to deny the permit even if it complies with all applicable statutory requirements, quoting the language from the *American Corn Growers* case stating that nothing in the Clean Air Act provides for issuance of a PSD permit as a matter of right.

Response: The Air District agrees with the comments that a facility is not entitled to a Federal PSD Permit as a matter of right. To the contrary, a facility must comply with strict requirements as set forth in 40 C.F.R. section 52.21 in order to be eligible for a Federal PSD Permit. The Air District disagrees that it can or should deny a Federal PSD Permit for a facility that does satisfy these requirements, however. The Federal PSD Program was set up to ensure a balance between protecting air quality in attainment areas and allowing economic activity consistent with air quality goals. Where a project satisfies all applicable requirements of the Federal PSD Program, it is eligible for a PSD Permit. Moreover, to the extent that the Air District has the discretion to deny a permit even where it satisfies all applicable Federal PSD Permit requirements, the Air District has concluded that it should issue a Federal PSD permit for this project. As detailed in the District's analyses, the facility satisfies all applicable legal requirements for a PSD permit; it will utilize current state-of-the-art electrical generating equipment and pollution control equipment; it will have the lowest emissions of any similar facility generating the same amount of electric power; and it has been determined by the CEC to be an appropriate facility for this location. Although the PSD permit review is independent of and not subordinate to the CEC's licensing decision under California law, the Air District is mindful of the California legislature's intention that the CEC should be the primary decision-making body with respect to new thermal power plant siting decisions in California. The Air District would therefore be hesitant to second-guess the CEC's licensing decisions in the context of a Federal PSD permitting review where the proposed project satisfies all applicable PSD requirements, even if it had the discretion to do so. For all of these reasons, the Air District disagrees that it can deny a Federal PSD permit for a project that satisfies all applicable PSD requirements, and in any event would not find it appropriate to do so here even if it had the discretion to do so.

Comment XVI.6. – Non-Attainment NSR Permitting For Projects Impacting Adjacent Non-Attainment Areas:

The Air District received comments noting the difference between the PSD permitting requirements applicable in attainment areas and the Non-Attainment NSR permitting requirements applicable in non-attainment areas, and stated that the District needs to conduct a Non-Attainment NSR analysis for the proposed facility. The commenters implied that the Non-Attainment NSR analysis needs to be conducted for PM_{2.5} and for ozone.

Response: The Air District has undertaken a Non-Attainment NSR permitting analysis for this facility under its District NSR regulations, District Regulation 2, Rule 2 (as incorporated for power plants by Regulation 2, Rule 3). This analysis, which was incorporated into the CEC's overall environmental review for the project, resulted in the District's Authority to Construct

(which implemented the CEC's Air Quality conditions of certification). That Non-Attainment NSR permit was appealed and upheld. The Air District therefore disagrees that it needs to conduct further Non-Attainment NSR analysis for this facility.

The Air District also notes that with respect to PM_{2.5}, under 40 C.F.R. Part 51, Appendix S, facilities are subject to permitting requirements only if they emit over 100 tons per year of PM_{2.5}. Since this facility will emit less than 100 tons per year of PM_{2.5}, it is not subject to Non-Attainment NSR requirements for that pollutant. The Air District explained this situation in the Additional Statement of Basis (*see* pp. 54-55), and the District finds nothing in these comments to suggest that the analysis is incorrect.

Comment XVI.7. – Integration of Non-Attainment NSR and PSD Permitting:

The Air District received comments requested clarification regarding whether the Non-Attainment NSR and PSD permitting for the Russell City facility was conducted in an integrated permit proceeding. Some comments also requested clarification on whether Non-Attainment NSR permitting for PM_{2.5} would be conducted in an integrated proceeding if and when the Bay Area's non-attainment designation for PM_{2.5} becomes effective and why it would make sense to do so.

Response: The Air District responds by clarifying that under its Delegation Agreement with EPA Region 9, it conducts Non-Attainment NSR permitting and PSD permitting in an integrated proceeding. This is how the permitting for this facility has been conducted. The District issued the Non-Attainment NSR permit (the District's Authority to Construct) and the PSD permit at the same time, on November 1, 2007. The District Authority to Construct was appealed and upheld, and so that permit has become final. The PSD permit was appealed and remanded, and so the Air District is conducting further proceedings for that permit in response to the EAB's order. With respect to Non-Attainment NSR permitting for PM_{2.5}, the Air District has consulted with EPA Region 9 as to how that permitting will be conducted, and EPA Region 9 has authorized the District to conducting permitting for those requirements in the same integrated proceeding. It makes sense to do so because it is simpler for all concerned, including the agencies, project applicants, and members of the public, for a single agency to address as many permitting requirements as possible that may apply to a facility in one integrated permit proceeding. Nothing in these comments suggested that there was anything defective in how the Air District has undertaken the integrated permitting process here, and so the District finds nothing in the comments to provide cause to change any permit conditions or decline to issue the permit.

Comment XVI.8. – History of Permitting Process:

The Air District received comments claiming that some of the analysis underlying the District's proposal to issue a PSD permit for this facility, including CEC analysis regarding what kind of generating capacity is needed in California, is "stale" and "scattered over the last decade".

Response: The Air District disagrees that its analysis supporting the Federal PSD Permit for this facility is not current. All of the provisions of the permit are supported by a current up-to-date analysis as set forth in the Statement of Basis and Additional Statement of Basis documents, these Responses to Comments, and in the other documentation the Air District has relied on for

this permit. In any areas where this analysis has relied on work performed earlier on in the permitting process, the Air District has reviewed it to ensure that it is still current, and has updated it in any areas where it was not current. The comments the Air District received on this issue did not point to any specific areas where the District's analysis was out of date, and the Air District is not aware of any. The Air District therefore disagrees with these comments and finds nothing in them to provide cause to change any permit conditions or decline to issue the permit.

XVII. FEDERAL PSD PERMIT NOTICE & COMMENT REQUIREMENTS

The Air District received a number of comments addressing the procedural requirements for processing Federal PSD Permit applications, including public notification, publication of the District's rationale for the proposed permit conditions, and an opportunity for public comment on the proposed permit. The Air District responds to these comments in this section.

A. Public Notice of District Actions

Comment XVII.A.1. – Public/Agency Notification of PSD Review Process:

The Air District received comments asking whether the District provided notice of the proposed Federal PSD Permit to a number of governmental entities, as well as other organizations, stakeholders and members of the public. These comments made specific reference to entities and individuals to whom notice is required under the applicable Federal PSD notice requirements and the Air District's Delegation Agreement with EPA Region IX.

Response: The Air District provided notice to all individuals, governmental bodies, and others who are entitled to it as required by the applicable PSD notice regulations and the Delegation Agreement. Copies of all of the public notice documents for this permitting action, including mailing lists, proofs of newspaper publication, *etc.*, are included in the record documents the Air District is making available in this matter. The Air District notes that the significant public interest expressed in this project highlights the fact that the District's public notice and outreach efforts were very broad and robust.

B. Information Provided to the Public/Explanation of Basis for Proposed Permit

Comment XVII.B.1. – Statement That A PSD Permit Was Issued In 2002:

The Air District received comments during the first public comment period stating that the Air District had incorrectly stated that a Federal PSD Permit had been issued for this project in 2002 along with the state-law permitting documents. These comments stated that there was no Federal PSD permit issued at that time, and that as a result the Air District could not treat the current permitting action as an amendment to an existing permit. The Air District corrected the record on this point when it issued the Additional Statement of Basis in August of 2008, and clarified that it was issuing a new Federal PSD Permit, not an amendment to a previously-issued permit. The Air District further explained that its original permit analysis, as well as all of its subsequent additional analyses, was based on a review of the project as a new project and not as an amendment, and that the project as a whole complies with all Federal PSD requirements for a new project. (*See generally* Additional Statement of Basis at pp. 5-6.) Subsequent to publishing this further discussion of the issue, the Air District received further comments during the second public comment period. The further comments acknowledged that the Air District had corrected the record in this regard, but objected that the Air District had not adequately explained this detail in the August 2009 public notice and related documents. These comments also stated that a project Fact Sheet that the Air District prepared (in addition to the formal public notice and Additional Statement of Basis) included conflicting information on this issue, explaining that the

District was not proposing to issue the permit as an amendment but also referencing the older incorrect information about the amendment. These comments suggested that the proposed permit should be re-noticed for further public comment to provide further information and explanation regarding this situation.

Response: The Air District disagrees that it has not fully explained for public review that this is a new permit and not an amendment to an existing permit, and further disagrees that it did not adequately inform the public of this situation. The Air District clearly explained the situation in the Additional Statement of Basis, and corrected the earlier misstatements regarding whether a PSD permit had been issued initially. Any interested member of the public who has been following this permitting proceeding would have been aware of these facts from reviewing the Additional Statement of Basis. The fact that the public was not misled by this situation is further underscored by the fact that members of the public have not felt constrained to comment only on a subset of issues that they may have believed were involved in an “amendment” to an earlier permit. To the contrary, a review of the comments the Air District has received on a wide variety of issues involving this project, including in many areas where the analysis and issues have not changed since the project was initially proposed. Indeed, this situation is not surprising given that the Air District conducted a full review of all aspects of the project, including elements that are not changing, even in the initial Statement of Basis that was put forward as involving an amendment to an existing permit. This breadth of comment that the Air District received controverts the assertion made in these comments that the public was misled in any substantive way by the Air District’s treatment this issue.

Some of the comments appear to criticize the Air District’s August 2009 public notice for not having explicitly called out this issue in the text of the notice, and for instead referring interested members of the public to the Additional Statement of Basis. The Air District disagrees that it misled or misinformed the public in this regard. Correcting such a misstatement in an additional statement of basis document is not something that needs to be specifically identified in the public notice on the document under the Federal PSD notice requirements where it is made clear in the statement of basis document. (*See* 40 C.F.R. § 124.10(d).) Moreover, the public notice clearly referenced the Additional Statement of Basis for more information, and that document provided the full explanation of the amendment/new permit issue. Interested members of the public therefore had full notice of the Air District’s further explanation, and any interested members of the public who followed up by reviewing the Additional Statement of Basis would have seen the Air District’s full explanation.

For all of these reasons, the Air District disagrees with these comments stating that it should provide further public notice regarding the fact that this is a new permit, not an amendment to an existing permit.

Comment XVII.B.2. – Identification of Project Location:

The Air District received comments questioning how the project location was identified in the permitting documents. The comments questioned whether the site should have been identified by its geographic location in relation to nearby landmarks (*i.e.*, its proximity to certain geographical features such as the San Francisco Bay, *etc.*) instead of by street address and nearest road intersection. The comments also questioned whether the Air District had adequately

described how far the current project location is from the original project location and the reasons why it was relocated. Some comments suggested that the project location was not adequately identified in the public documents supporting the permit, and that the areas surrounding the project location were not adequately identified sufficient to inform the public of where the project would be located and what the surrounding area is like. Some comments also stated that the Air District did not properly advise USFWS and other public agencies of the actual site, and stated that the Air District misled these agencies by describing the location as industrial without referencing its proximity to the Hayward shoreline.

Response: The public notices that the Air District issued cited the specific project location giving the street address and nearest cross-streets, which afforded members of the public full notice of exactly where this project will be located.³⁷⁶ Identifying the specific location in this respect gave members of the public full information sufficient to locate the project site in relation to any other geographic features that may have been of interest to them. Indeed, with the specific project location, members of the public were able to visit the project location and see for themselves exactly where it will be located and what the surrounding areas are like. This information gave the public full notice of the project's location as well as surrounding areas, including features such as the industrial nature of the area and its proximity to the Hayward shoreline.³⁷⁷ And the Air District received a large volume of comment regarding the project's location and setting from members of the public who were fully able to understand and identify where it would be located, where it would be in relation to nearby areas of concern, and what the surrounding setting is like. These comments, which are based on a clear understanding of where the project will be located, belie the comments suggesting that the public was not adequately informed of the project location.

Comment XVII.B.3. – Information Regarding Procedural Posture of Permitting Action:

The Air District received comments questioning whether additional information regarding the procedural posture of this permitting action, including the prior procedural history and avenues

³⁷⁶ Some comments also criticized a revised public notice the Air District issued to correct the facility mailing address that had been incorrectly listed in an earlier notice. These comments stated that although the Air District corrected the facility address, it did not explain exactly which of the various addresses contained in the notice (*e.g.*, the company headquarters, the address for submission of public comment to the Air District) had been corrected. The Air District disagrees that this corrected public notice was insufficient or unreasonably confusing in this regard. If any member of the public who received the second notice was confused about which address had been corrected from the initial notice, that person could easily have compared both notices to see what had changed.

³⁷⁷ The District also received several comments regarding the use of the “Russell City” name for the facility. Some commenters objected to the use of this name because the city in which the facility is officially located is the City of Hayward, CA. Other comments praised the use of the “Russell City” name in recognition of the unincorporated community that historically existed in the area that was known by that name. The facility's name is not relevant to any PSD permitting issues, and the Air District disagrees that there is any way that any members of the public could be misled by the use of this name given all of the information the Air District provided regarding the location of the facility.

for potential further appeals, should have been more explicitly described in the permitting documents. The comments questioned whether the Statement of Basis should have described other avenues for appealing permits for this facility, besides appeal of the CEC license to the California Supreme Court, appeal of the District Authority to Construct through the state appeals system, and appeal of the federal PSD Permit through the Federal appeals system. The comments questioned whether the Statement of Basis should have noted that Alameda County was one of the parties that appealed CEC denial to Supreme Court; and that the Supreme Court dismissal was “without review”. The comments similarly questioned whether additional details regarding the EAB remand should have been provided.

Response: The Air District notes that these comments merely asked questions about what information the Air District should have provided in its permitting documents, and did not identify any area where the Air District did not provide sufficient information or identify any additional information the Air District should have provided. These questions therefore do not contain any substantive comment that the Air District is required to respond to. To the extent that the questions can be construed as comments suggesting that the Air District in fact was deficient in the information it provided regarding appeals procedures, the Air District disagrees that it was required to provide any further information under the applicable Federal PSD requirements. The Federal PSD requirements in 40 C.F.R. section 52.21 and 40 C.F.R. Part 124 do not require that the Air District specify the appeals procedures for any permits or approvals at the draft permit stage. (*See* 40 C.F.R. §§ 124.7-124.10.) The Air District provided the information in its Statement of Basis and related documents over and above the minimum required by the Federal PSD requirements in an attempt to inform the public as much as reasonably possible regarding how the overlapping state and federal licensing/permitting process works for power plants in California. The Air District considers the information it provided – specifying how the CEC license, the Federal PSD permit, and the District Authority to Construct, respectively, are issued and how they can be appealed – to have done a very good job in achieving this goal, and disagrees that there was any more information that it should reasonably have provided (let alone was *required* to have provided under the Federal PSD permitting requirements). The comments on this issue do not identify (expressly or even impliedly) any reason where the permitting process for this PSD permit was defective.

Comment XVII.B.4. – Information Regarding Project Ownership:

The Air District received comments asking whether the public notice issued for the proposed permitting action should have included more information on the ownership of the project applicant, Russell City Energy Company LLC.³⁷⁸ The comments noted that the project owner, Russell City Energy Company LLC, is an affiliate of Calpine Corporation. The comments asked about the details of these companies’ affiliation, and asked whether General Electric (GE) has any affiliation with Russell City Energy Company LLC and whether GE has an ownership interest in the project. These comments suggested that these corporate relationships need to be explained in the permitting documents and in the public notice of the District’s proposed permitting action under the requirements of 40 C.F.R. Part 124.

³⁷⁸ The Air District also received questioning whether the project owner’s address was correctly listed. The Air District is not aware of any inaccuracy in the project owner’s address, and the comments have not identified any.

Response: Under 40 C.F.R. Part 124, the public notice is required only to identify the project owner, which is the Russell City Energy Company, LLC. The public notice is not required to identify other persons or entities that may have an ownership interest in the company that owns the project. The Air District went over and above what is required by Part 124 in identifying the owner's affiliation with Calpine Corporation, which is a corporate parent company that is more widely identifiable than the entity that actually owns the project. This was information that the Air District thought might be of interest to members of the public, even though it was not required by Part 124. The Air District does not believe that further information about the corporate ownership of Russell City Energy Company, LLC would have been of great public interest, or that it should have reasonably been included in the description of the project owner. The Air District does not find any information in these comments to suggest that this conclusion was unreasonable or unwarranted. Certainly, there is nothing in these comments to suggest that the public notice was deficient in any way, as information on parent companies and corporate affiliations is not required under Part 124.

Moreover, these comments do not suggest that there are any facts regarding project ownership that would bear on any of the issues involved in the PSD permitting process or suggest that any permit conditions should be changed. Thus, to the extent that these comments state that additional information should have been explained in the permitting documents, they do not explain how that information would have affected the outcome of the process or resulted in a different determination on the permit or in different permit conditions.

For all of these reasons, the Air District finds nothing in these comments to suggest that its permitting process and ultimate permit decision have been flawed or need to be revisited in any way.

Comment XVII.B.5. – Additional Detailed Information Not Required For PSD Permit

Analysis:

The Air District received comments questioning whether its public notices and Statement of Basis documents should have included additional detailed information regarding the project and its emissions.

Response: The Air District disagrees that the level of detail it provided in its public notices and in its Statement of Basis documentation was insufficient to provide the public with adequate notice of this project and information on which to review the Air District's permitting decision. The Air District has provided a large amount of information to the public in order that interested parties can understand what this facility will involve and can review the Air District's permitting analyses with respect to the facility and the applicable Federal PSD requirements. The Air District is not aware of any information relevant to any part of the Federal PSD Permit process that the Air District has not made publicly available, and the comments have not identified any. The comments have pointed to some information that is not relevant to the permitting analysis and suggested that it needed to be made available and/or included in the public notices for this facility, but the Air District disagrees that such information must be identified or made available if it is not part of the Federal PSD analysis.

Comment XVII.B.6. – General Criticisms of the Statement of Basis:

The Air District also received comments generally criticizing the Statement of Basis. These criticisms include claims that the Statement of Basis was poorly organized, that units of measure and their abbreviations are not defined, that numbers in different tables appear to contradict each other, that tables do not include notes with the information necessary to explain them, *etc.*

Response: The Air District strives to make its public documents as clear and understandable as possible, and will consider these suggestions on how to improve the various reports and analyses it publishes for public review. The Air District disagrees, however, that overall the documents it has published with respect to this permitting action have been insufficient to adequately inform the public of the principal facts and significant factual, legal, methodological and policy questions considered in reviewing this permit. Despite the criticisms voiced in these comments, the Statement of Basis and related documents clearly described the type of activity that will be involved with this project, the type and quantity of emissions that will be involved, the potential for consumption of PSD increments, the basis and derivations of the applicable permit conditions and the reasons for them, and information on how to participate in the proceeding and how to get more information. These comments have not identified any specific area where the Air District's documentation was not sufficiently clear and understandable under the circumstances, and have not identified any particular issue in which the Air District's analysis was not sufficiently explained in order to allow for informed public review. Moreover, the comments have not identified any permit conditions they claim are inappropriate, or not adequately substantiated by sufficient explanation or analysis. For all of these reasons, the Air District does not find any reason in these comments not to issue the Federal PSD permit.

Comment XVII.B.7. – Responses To Questions Submitted by Commenters:

The Air District received comments stating that the District should provide answers to certain questions the commenters submitted during the initial public comment period, and should keep the public comment period open until the Air District has done so and until the commenters have had a chance to review such responses.

Response: The Air District has gone to great lengths to provide the public with relevant information regarding the Russell City project and the District's permitting analysis for it. The Air District has provided all of the information necessary for the public to understand the District's analysis and its basis for issuing the permit. The Air District disagrees that there is further information that it needs to provide at this stage before making a final permit determination. To the extent that the commenters' questions can be construed as containing comments on the District's analysis and the draft permit, the Air District is responding to them in this Responses to Comments document.

C. Opportunities For Public Comment

Comment XVII.C.1. – Opportunities to Submit Comments:

The Air District received comments questioning whether it complied with several regulations dealing with public comment opportunities, including 40 C.F.R. § 51.166(q) (public participation for SIP-Approved PSD programs); 40 C.F.R. § 124.13 (longer comment period to the extent shown to be necessary); 40 C.F.R. § 124.8 (Fact Sheet); and 40 C.F.R. § 124.6 (Draft Permits).

Response: The Air District has complied with all applicable requirements for providing public comment opportunities for this PSD permit. The public comment requirements are set forth in 40 C.F.R. Section 52.21 and the relevant provisions of 40 C.F.R. Part 124, and the Air District has not only fully satisfied all applicable requirements, it has even gone well beyond the minimum required in many areas. In particular, the Air District provided two public comment periods, each well over the minimum 30 days required by the regulations. The comments have not identified any reason why the time periods provided for public comment were insufficient, or why there may be a need for additional time for public comment pursuant to 40 C.F.R. section 124.13. Moreover, the Air District provided what the regulations call “Fact Sheets” under 40 C.F.R. section 124.8 (what the Air District called the “Statement of Basis” and “Additional Statement of Basis”), which set forth the degree of PSD increment consumption expected, which is less than significant here for the PSD pollutants for which increments have been established; a detailed summary of the basis for the draft permit conditions, with appropriate references to governing authority and to documentation in the Air District’s permitting file;³⁷⁹ a description of how the Air District will make its final decision on the draft permit describing the comment process and the public hearing that was being held; and the name and phone number of a contact person for more information. Furthermore, the Air District circulated for public review its Draft Permit setting forth all of the proposed permit conditions as required by 40 C.F.R. section 124.6 (both as initially proposed in December of 2008 and as revised in the August, 2009, proposal). In this way, the Air District fully complied with all of the requirements for providing the public opportunities for comment on the draft permit.³⁸⁰ The Air District also notes that the large volume of public comment received is a testimony to the robust comment opportunity that was provided. The Air District notes that these comments simply questioned how the Air District complied with these requirements and did not point to any area where they claimed the Air District’s efforts were deficient. But to the extent that the comments

³⁷⁹ Note that in this manner the Air District essentially provided a formal public administrative record for the Statement of Basis, even though this is required only where EPA is the issuing agency (*see* 40 C.F.R. § 124.9). The District believes in providing public access to a written record as a matter of governmental transparency and good administrative practice, even though it is not required by law for Federal PSD Permits. Moreover, to the extent that the administrative record requirement is found to be legally applicable to permits issued by state agencies, the Air District believes that the record it made available for public review would satisfy the requirement.

³⁸⁰ The comments cited some authorities that are not applicable to this project. For example, 40 C.F.R. Section 51.166 applies to State PSD programs seeking approval by EPA in a State Implementation Plan. It provides requirements for states in writing their plans, and does not establish requirements for individual permitting actions. For Delegated Federal permitting actions such as this one, the requirements for the individual permitting action are set forth in 40 C.F.R. Section 52.21 and 40 C.F.R. Part 124, not in 40 C.F.R. Section 51.166. In other areas, specific subsections of requirements in 40 C.F.R. Part 124 are not applicable by their terms, such as the requirement to specify any variances under Section 124.63 in a draft NPDES permit, which is inapplicable because this is not an NPDES permit there are no such variances here in any event.

were intended to suggest that the Air District's efforts were deficient in some way, the Air District disagrees for the reasons explained above.

Comment XVII.C.2. – Openness to Considering Public Comments:

The Air District received comments suggesting that it is not in fact open to considering comments from the public regarding the proposed permit, and is using the public comment process simply to create a record for foregone conclusions about whether and how this facility should be permitted. These comments claimed that the Air District had already decided on its final determination regarding this permit before taking public comment. They claimed that the Air District has been hostile to public comment and has attempted to prevent public input.

Response: The District strongly disagrees with these comments. The Air District went well beyond the minimum legal requirements in providing public outreach and in encouraging public interest in this permitting action. The Air District very much appreciates the insightful comments it received from the public, and in fact has incorporated a number of comments to improve the permit. For example, based on public comments (among other information), the Air District has revised the Carbon Monoxide BACT limit downwards from 4.0 ppm to 2.0 ppm. Similarly, the Air District revised the voluntary Greenhouse Gas BACT analysis that the applicant requested to result in a lower BACT emissions level as well as an annual compliance test requirement to ensure that efficiency does not unduly degrade over time. The Air District also reviewed its startup BACT analysis based in part on public comments and is finalizing the permit with more stringent startup limits as a result. These actions speak for themselves, and show that the Air District had not made up its mind regarding the final permit and in fact changed its mind based in part on comments received from the public. These actions highlight the fact that Air District does greatly value public input on its permitting actions, and has acted on the public's input in this case to strengthen the final permit.

Comment XVII.C.3. – Other Communications Received Outside of the Formal Notice-and-Comment Process:

The Air District also received comments asking whether other submissions from the public, such as comments received during comment periods for earlier permitting determinations, comments submitted during comment periods for other facilities, and documents filed in permit appeal proceedings, have been considered in these Responses to Comments.

Response: The Air District is legally obligated to consider and respond only to comments submitted during the comment periods on the current permitting action, which includes the two comment periods it provided on its draft Federal PSD Permit. The Air District has reviewed and considered all such comments, as provided in this Response to Comments document. As a matter of practice, however, the Air District reviews all other relevant information it may receive or may have received in the past regarding the permit under review, even if that information may not have been made as a formal comment during the comment period that the District is required to consider and respond to. In this way, the Air District can ensure that it incorporates the best information into its permitting analyses even if that information did not come to light in a formal comment. The Air District has done so here, and has considered additional information received outside of the two formal comment periods provided for the current permitting action. Any such submissions from the public are not formal public comments in this proceeding that need to be

responded to on the record, however, and so the Air District has not formally identified any such additional information received and provided a formal written response (although where certain information has touched on relevant issues, these Responses may cover those communications as well).

Comment XVII.C.4. – Recirculation For Further Public Comment:

The Air District received some comments suggesting that the District should re-circulate revised PSD permitting analyses for additional public review and comment.

Response: The Air District agreed that the revisions it made to the proposed permit after the first round of public comments would benefit from further public review and comment. The Air District also conducted additional evaluation and analysis, including the PM2.5 source impact analysis and revisions to other analyses, and agreed that it would be beneficial for the public to review and comment on them. The Air District therefore published its Additional Statement of Basis and revised draft permit and held a second public comment period, including a second public hearing. After two rounds of public comment, the Air District does not believe that a further public comment period is necessary. The Air District is making only minor changes in the final permit as compared to the most recent draft it published and took comment on, and these minor changes do not change the substance of the permit conditions in any material way. The public has had full notice of the Air District’s proposal to issue this Federal PSD permit and full opportunity to comment on the permit, the conditions it includes, and the analyses on which it was based.

Comment XVII.C.5. – Multi-Jurisdictional Permitting Process:

The Air District received comments that recited the history of the permitting process involving the CEC and the Air District and the various state-law and federal permits involved, and stated that the process has been “bifurcated” and difficult to follow by members of the public. These comments implied that this permitting history impeded informed public participation and is incompatible with the requirements for PSD permitting.

Response: The Air District disagrees that the fact that the permitting history for this facility has been bifurcated and involves overlapping state and federal permitting requirements impedes informed public participation or is incompatible with applicable Federal PSD permitting requirements. The permitting process for a facility such as a new power plant may be relatively complicated, but that does not mean that members of the public cannot understand it. Indeed, the detailed comments the Air District received from many members of the public – both from trained environmental professionals and from laypeople with no formal environmental or regulatory training – shows that the public can follow and participate in the permitting process before the various agencies that are involved in the permitting of new power plants. Moreover, these comments have not identified any area where the Federal PSD requirements are inconsistent with a permitting process such as the process that the Russell City Energy Center has gone through, and the Air District is not aware of any. To the contrary, the Environmental Appeals Board has explicitly reviewed the overlapping permitting process applicable to power plants in California in several cases, and has not found anything inconsistent. For all of these reasons, the Air District disagrees with these comments. The Air District finds no reason why the public cannot adequately participate in the power plant permitting process as it is set up in

California, nor any reason why the public could not participate fully here. The Air District finds nothing in these comments to suggest that it cannot issue the Federal PSD permit here or that any permit conditions are inappropriate or should be changed.

D. Public Availability Of Supporting Information

Comment XVII.D.1. – Public Availability of the Permitting Record:

The Air District received a number of conflicting comments regarding the documentation that it made available regarding its permitting analysis for the project. On the one hand, some commenters expressed appreciation that the District made its documentation available for the public to review and that District staff had provided them with information. On the other hand, some commenters claimed that the District had not made its supporting documentation sufficiently available for review.³⁸¹ Some commenters stated that the Air District should have developed a formal “docket” for its underlying documentation. Some commenters also stated that the documentation that the Air District made available for public review is voluminous, and that it was difficult for members of the public to review it because they either had to come to the District’s headquarters in San Francisco to review it there in person, or pay for photocopying which would have been expensive. These comments stated that the District should provide electronic access to the documents and provide an additional 30-day comment period.

Response: The Air District agrees with the comments expressing praise for how it made its records available, and disagrees with the comments stating that the Air District’s efforts were inadequate. The Air District notes that when it issued its initial Statement of Basis in December of 2008, it made all of the documentation supporting the analysis in the Statement of Basis available at that time, and a number of interested members of the public came to District headquarters to review it and to have copies made to take away. When the Air District issued its Additional Statement of Basis in August of 2009, it made further documentation available (along with what was initially made available) supporting the additional analysis in that document. At that time, the Air District also compiled an index of all of the documentation it was making available for public review, and published the index on its website. A number of interested members of the public came in to review this additional information as well.

These efforts to make the documentation supporting the Air District’s permitting analyses available to the public more than satisfy the public participation requirements of the Federal PSD Regulations. For state agencies issuing PSD Permits pursuant to a Delegation Agreement, the applicable Federal PSD Regulations do not require the agency to make any documentation available, as the applicable requirements for making the permitting record available for public review and inspection apply only when EPA is the permitting authority. (*See* 40 C.F.R. §§ 124.9, 124.11, 124.10(d)(1)(vi).) Nevertheless, despite the absence of a legal requirement, the Air District makes its permitting documents available for public review in order to encourage informed public participation, which is what it did here.

³⁸¹ Interestingly, the commenter who objected to the way the Air District made its documentation available for public review also incorporated by reference the comments praising the District for how it made its documentation available to the public.

The Air District also disagrees that it was required to maintain a formal “docket” for its permitting files and that it was required to make all such documentation available electronically on the internet. As noted above, there is no requirement to make the underlying documentation available at all for permits that are issued by State agencies and not EPA. But even if the requirements applicable for EPA-issued permits were applicable, there is nothing in the regulations that states that a formal “docket” must be maintained, or that they must be made available electronically. Moreover, the Air District did make its index of documents available electronically, which allowed members of the public to review what was available and to request copies of specific documents without having to visit District headquarters in person.

Comment XVII.D.2. – Air District Responses to Requests for Documents Under the California Public Records Act:

The Air District received comments claiming that the commenter had requested access to District records regarding the permitting of this facility under the California Public Records Act, but was denied. These comments suggested that the Air District had failed to adequately inform the public of the underlying basis for its proposed permit such that the public could understand and comment on the proposed permit.

Response: The Air District has responded to all California Public Records Act requests regarding public records for this facility. Moreover, in addition to and separate from responding to all Public Records Act requests, the Air District made all relevant documents regarding the permit available for public review. There is therefore nothing in these comments that suggests that the Air District failed to adequately inform the public of the underlying basis for the permit or that the public did not have adequate information on which to evaluate and comment on the proposed permit.

The relevant history of the public records act requests regarding this facility is as follows. Mr. Rob Simpson submitted a Public Records Act request on September 11, 2008, in which he requested all Air District documents regarding the facility “subsequent to EPA Remand,” which the EAB issued on July 29, 2008. The Air District began working on responding to that request, and provided the documents from the permit engineer’s working file – which were the most relevant and readily available documents – one week later, on September 18, 2008. To provide a complete response, the Air District then conducted a comprehensive records search of all records created since the EAB Remand Order on July 29, 2008, that could be located anywhere within the Air District’s possession. This included searching paper records as well as electronic records such as email correspondence and other electronic files such as word processing documents and PDF documents stored on the Air District’s central computer servers as well as on staff’s individual computers. This search included paper and electronic files from the large number of Air District staff who have worked on or had contact with this project from multiple Air District divisions. Once all of the public records since the EAB Remand Order had been collected, they were reviewed by legal counsel to remove any documents not subject to public disclosure, such as privileged attorney-client communications. When all of these tasks were completed, the full set of responsive records – which constituted several boxloads of records – were made available for the requestor to review, on December 18, 2008. During this time period, the requestor also engaged in a large volume of email correspondence with various Air District staff, and in some of those emails suggested that he wanted to review additional documents beyond the documents

“subsequent to EPA Remand” that he had originally requested. After some further communications to ascertain exactly what universe of records he was requesting, on January 15, 2009, the commenter clarified that he was requesting all documents anywhere within the Air District’s possession related to the Russell City facility “from 2008 and this year [2009]”. The Air District therefore began the process of compiling and reviewing all documents related to the facility back to January 1, 2008, as it had done with the requestor’s first request of September 11, 2009. The Air District completed these tasks and made the requested documents available for the requestor’s review on June 15, 2009. The Air District has therefore responded to all Public Records Requests regarding this facility.

Moreover, during this time period, the Air District made available for public review and inspection all of the relevant documentation on which its Proposed PSD Permit and Statement of Basis were based. These documents were made available for review at the Air District’s headquarters at the start of the public comment period by any member of the public interested in the proposed permit, without the need for a special request under the California Public Records Act or otherwise. The location and availability of these documents was published in the Air District’s public notice of the proposed permit and in the Statement of Basis. Several interested members of the public took advantage of the public availability of these documents and came in and reviewed them (or took copies to review elsewhere). Indeed, one commenter even praised the Air District for its efforts in making the documentation accessible to the public, which comments Mr. Simpson incorporated by reference. The Air District also made all of this documentation available during the second comment period, as well as additional documentation that it had used in the further analysis undertaken for the August 2009 Additional Statement of Basis.

Mr. Simpson, who submitted the Public Records Act Requests, therefore had full access to all of the *relevant* documentation during both comment periods,³⁸² even if the Air District had not fully responded by the close of the initial comment period to his very broad Public Records Act requests for *all* documents in any way related to the facility anywhere within the Air District’s possession. The only documents that had not been made available at that point were documents that may have related to the facility in some way but not used or relied on in the District’s permitting analysis. These could have included documents such as communications regarding tangential issues, housekeeping matters such as arranging meetings to discuss the project, and so forth. Mr. Simpson was entitled to review these documents under the California Public Records Act, and the Air District did ultimately make them available to him, but they were not documents on which the Air District’s proposed permit and Statement of Basis were based and thus were not necessary for a full understanding of the Air District’s proposed permitting decision. The Air District therefore disagrees that there was any reason to keep the first comment period open until it had fully responded to Mr. Simpson’s requests. But in any event, the Air District provided a further public comment period, and by that time it had responded fully to all outstanding records requests. To the extent that there was any information in the additional documentation requested by Mr. Simpson in his Public Records Act requests, he had a chance to review that information

³⁸² Notably, during the first comment period the Air District repeatedly reminded Mr. Simpson of the documents it had made available for public review during the comment period and invited him to review them in order to understand the basis for the proposed permit.

and submit comments based on it during the second comment period. (The Air District explicitly stated in the Additional Statement of Basis that it was inviting any comments the public may have based on evidence or information that was not ascertainable during the initial comment period (*see* Additional Statement of Basis at p. 3).) The Air District therefore disagrees that it failed to adequately inform the public of the basis for its permitting decision with respect to the underlying documentation, as it made all of the supporting documentation available during both comment periods, and made the additional information Mr. Simpson requested available within a reasonable time period and during the whole of the second comment period. Mr. Simpson cannot claim that he (or any other member of the public) was not fully informed of the basis for the Air District's proposed permit.³⁸³ The Air District also notes that Mr. Simpson did not register any further objection during the second comment period, did not request any further documents, and did not suggest that the Air District should have made additional documentation available during the second comment period.

Finally, with respect to whether the Air District failed to comply with any applicable legal requirements, the Air District has in fact gone well beyond the minimum legal requirements in making its permitting documentation available for public review. The Air District notes that the Federal PSD requirements require the permitting record documents to be made available only for EPA-issued permits, not for permits issued by state agencies such as the Air District, as discussed above. (*See* 40 C.F.R. §§ 124.9, 124.11, 124.10(d)(1)(vi).) But in any event, the Air District did make all of its relevant underlying documentation available for review by the public, including Mr. Simpson, during the two comment periods on the permit. The Air District did not provide the additional very broad set of documents Mr. Simpson requested in his Public Records Act requests before the close of the first comment period, but providing such a response was not required in order to fully understand the basis for the proposed permit, and was not required by the Federal PSD regulations. And ultimately, the Air District did in fact provide the requested records before the second comment period, so to the extent that it was legally required to provide a comment opportunity after responding to outstanding records requests, it did so here. For all of these reasons, the Air District disagrees that there was anything defective in its actions to inform the public about the basis for this permit, including making all supporting documentation publicly available.

E. Prior Permitting History

Comment XVII.E.1. – No PSD Permit Issued in 2002:

The Air District received comments noting that the District did not actually issue a PSD permit in 2002 in connection with the original permitting of the facility. The commenters claimed that the District cannot issue an amended PSD Permit because there is no existing permit to amend. They claimed that the District needs to treat this application as a new permit application.

³⁸³ The lengthy and detailed comments submitted by Mr. Simpson, as well as many other commenters, emphasize the extent to which members of the public were able to inform themselves regarding this permit based on the documentation and analysis the Air District published and made available.

Response: The commenters are correct that when the facility was initially permitted in 2002, the District did not issue a final Federal PSD permit when it issued its Authority to Construct, as is the District's normal practice. The record indicates that the District did not finalize the Federal PSD permit at the time it issued the Authority to Construct because EPA Region IX had not completed its ESA consultation with the US Fish & Wildlife Service. The project applicant subsequently withdrew its plans to build the facility at the original location, however, and so the consultation was never finalized and the Federal PSD Permit was never issued.³⁸⁴

As a substantive matter, however, the Air District did treat this permit application substantively as a new permit rather than as an amendment, as the comments suggest it should have. In evaluating the project for compliance with Federal PSD requirements, the Air District did not rely in any way on the analysis prepared for initial permit. To the contrary, the Air District made clear in the Statement of Basis that it was evaluating the entire project for compliance with the Federal PSD requirements, not just elements that were changing since the initial permitting. As the Air District explained in the Statement of Basis, it analyzed both the amendments to the proposed project as well as the elements that were not being changed, and concluded “[t]he analysis of the elements that are not being amended shows that the conditions from the initial permit that are not being changed meet current applicable legal standard for Federal PSD Permit, and that they would *comply with current PSD requirements even if they were being proposed anew at this time.*” (Statement of Basis at p. 7 (emphasis added).) The detailed analyses provided in the Statement of Basis clearly support this conclusion. The Air District evaluated all of the equipment at the project from scratch to ensure that it meets current BACT standards as is required for a new permit application. The District similarly conducted an Air Quality Impacts Analysis (and related analyses) from scratch for the entire project, using the most current information and modeling techniques, as is required for a new project. The Air District's review of this project was therefore effectively a new permit evaluation, even if it was erroneously referred to in the initial Statement of Basis as a revision to an existing permit.

Furthermore, the Air District clarified this situation in the Additional Statement of Basis and corrected its earlier misstatements, and made clear that it was proposing to issue the permit as a new permit and not as an amended permit. The Air District specifically invited members of the public who had initially believed that this would be an amendment to an existing permit to provide any comments they may have on the issuance of a new permit, as opposed to an existing permit, during the second comment period. The Air District therefore agrees with the comments that it should treat this permit as a new permit, and responds that it has fully treated it as a new permit.

Comment XVII.E.2. – Changes to Federal PSD Permit Since 2007:

The Air District received comments questioning whether there have been applicable permitting rules that have changed since the issuance of the state-law permits in 2007 or whether there have been refinements to the technical analyses of the facility since that time.

³⁸⁴ See Letter from Gerardo C. Rios, Chief, Permits Office, U.S. EPA Region IX, to Ryan Olah, Chief, Endangered Species Division, U.S. Fish and Wildlife Service, June 11, 2007, subject: Request for Informal Consultation under Section 7 of the Federal Endangered Species Act for the Proposed Russell City Energy Center – Hayward, California, pp. 1-2.

Response: This comment appears to refer to any ways in which the Air District has expanded upon or revised any elements of its analyses underlying the Draft Federal PSD Permit since its earlier analysis in 2007 on which the PSD Permit was initially issued. The Air District responds by referring to the specific analyses set forth in the Statement of Basis and Statement of Basis and this Response to Comments document, which represent the Air District's most current analysis of the applicable Federal PSD Requirements. The Air District is issuing the Federal PSD Permit based on the most current regulatory requirements and the most current technical analyses.

XVIII. STATE-LAW LICENSE/PERMIT ISSUES

The Air District also received a number of comments regarding the CEC's license for this project, the Air District's Authority to Construct,³⁸⁵ and other California state-law requirements such as the provision of Emission Reduction Credits and compliance with the California Environmental Quality Act ("CEQA"). These state-law issues are not part of the Federal PSD Permit review process, and the Air District therefore has no obligation to consider and respond to them as they do not pertain to PSD permit issuance. The Air District nevertheless has reviewed and considered them since members of the public have expressed an interest in them, and the District responds to them in this section.

Comment XVIII.1. – Reopening State-Law Permitting Proceedings:

The Air District received comments contending that it should 'withdraw' the Determination of Compliance that it prepared for use by the CEC in the CEC's licensing proceeding for the Russell City Energy Center under California's Warren-Alquist Act. Some of these comments argued that the Determination of Compliance the Air District provided for the CEC's use in that proceeding needs to be re-analyzed and re-issued to reflect the Air District's subsequent analyses such as those that the Air District has undertaken in this PSD permit proceeding. Some comments stated that there have been new scientific and regulatory developments since the CEC licensing proceeding took place, such as PM_{2.5} and CO₂ regulatory developments and new scientific study on the effects of PM_{2.5}. Some of the comments also challenged the validity of the state law approvals the project has received, and suggested that a Federal PSD permit may not be issued unless it can be shown that the project complies with state law. These comments suggested that the Air District should conduct a further Determination of Compliance proceeding and solicit comments on state-law issues as well as on Federal PSD issues. Some comments claimed that the Determination of Compliance process and PSD Permit process are interdependent, and that if the Federal PSD permit process is reopened for additional public comment then the Determination of Compliance process must also be reopened. Some comments claimed that the District cannot issue a Determination of Compliance concluding that the project will comply with Federal PSD requirements until after the Federal PSD permitting process is complete.

Response: How the project complies with state-law requirements and how the CEC's licensing process was conducted are not issues that are implicated by the Federal PSD Permit requirements. These comments therefore do not raise issues relevant to the Air District's determination on the Federal PSD permit. To the extent that the commenters have any concerns about potential defects in the CEC licensing process that should be revisited at this point, those concerns should be addressed to the CEC directly, not in a PSD permit proceeding.

With regard to the Determination of Compliance that the Air District prepared for use by the CEC in its licensing proceeding, that document is not something that can be withdrawn or

³⁸⁵ The Authority to Construct is the District's Non-Attainment NSR Permit issued under state law pursuant to the District's SIP-Approved Non-Attainment NSR permit regulations, District Regulation 2, Rule 2.

vacated at this point. That Determination of Compliance was submitted to the CEC by the District in 2007, and it was then used by the CEC in its licensing proceeding, which culminated in a commission licensing decision, which has long been final and all avenues for appeal have been exhausted. The time for raising any concerns with the District's 2007 Determination of Compliance came and went long ago. To the extent that these comments suggest that events that have taken place since the CEC proceeding in 2007 have raised new or changed issues that should be revisited and further analyzed at this time, these comments should be directed to the CEC. If the CEC determines that these claims have merit and decides to undertake further proceedings, the Air District would be happy to participate in any such proceeding at the request of the CEC.

Regarding the interdependence of the Federal PSD Permit and the state-law licensing process under the Warren-Alquist Act, although the state and federal permitting mechanisms overlap, they are legally distinct and do not depend on each other. The fact that the Federal PSD Permit was remanded by the EAB did not invalidate the state-law licensing, in the same way that the California Supreme Court's upholding of the CEC's licensing decisions did not validate the Federal PSD permit. The Air District therefore disagrees with the comments stating that the Air District must reopen the state-law permitting proceedings because of the Federal PSD remand and that the Air District cannot issue a Determination of Compliance until after the Federal PSD permitting process is complete.

Comment XVIII.2. – Expiration of Authority to Construct:

The Air District also received comments stating that it should rescind the Authority to Construct because it is no longer valid. Some of the comments claimed that the Authority to Construct has become invalid by operation of 40 C.F.R. § 51.166(j)(4) on the grounds that the Authority to Construct was issued over 18 months ago.

Response: 40 C.F.R. Section 51.166 contains requirements for state Non-Attainment NSR Permitting programs generally. The requirements in that section do not apply to specific permits issued for particular projects such as the District's Authority to Construct for the proposed facility here.³⁸⁶ The expiration of the District's Authority to Construct is governed by District Regulation 2-1-407, which provides that the Authority to Construct expires after two years. Two years have now passed since the Authority to Construct was issued, and so the project owner has applied to the Air District for an extension of that Authority to Construct. The Authority to Construct extension will also implicate the CEC license provisions, and the Air District will participate in any CEC license proceeding as requested by the CEC. These issues regarding the District's state-law Authority to Construct and the CEC's license under the California Warren-Alquist Act are not Federal PSD issues, however, and do not implicate the Federal PSD permit that the District is issuing.

³⁸⁶ Some of the comments also cited other authorities relevant to the expiry of PSD permits (as opposed to Nonattainment NSR permits). The PSD permit is being initially issued concurrent with these Responses to Comments, and so its period of validity (18 months) is only just beginning now. It has therefore not expired under any view of the law, and the authorities regarding expiration of a PSD permit are not relevant here in the context of arguments about the expiration of the Authority to Construct.

Comment XVIII.3. – Non-Attainment NSR Permitting:

The Air District received several comments regarding its Non-Attainment NSR permitting for the facility. Some comments stated that the District's BACT analysis was inconsistent with the District's BACT approach under its Non-attainment NSR rules (District Regulation 2-2) and under the federal Clean Air Act and EPA's implementing regulations for Nonattainment NSR. These comments claimed that the District needs to conduct further Nonattainment NSR review and analysis for the project for NO_x, CO and PM_{2.5}. The comments objected to the Air District's position that the Non-Attainment NSR permit – the Authority to Construct – is final and is not being reopened in the PSD permitting action. Some implied that the Authority to Construct was invalidated by the remand of the Federal PSD permit. Some comments questioned whether avenues for appealing the Authority to Construct have in fact been exhausted.

Response: Non-Attainment NSR is a state-law permitting program conducted in accordance with the District's SIP-approved Non-Attainment NSR regulations. It is a separate permitting program and is not part of the Federal PSD permitting process. The Non-Attainment NSR permitting process, and the Authority to Construct that was issued at the culmination of that process, has been completed and is now final as discussed above. The Air District therefore disagrees that it can or should conduct further Non-Attainment NSR permitting analyses. The Air District has already completed the Non-Attainment NSR permitting analysis for NO_x and CO, and for PM_{2.5} the facility is exempt from Non-Attainment NSR permitting under 40 C.F.R. Part 51, Appendix S, as discussed in Sections VI and XIII above. Moreover, Non-Attainment NSR permitting is separate and distinct from PSD permitting and is subject to different regulatory requirements under different legal authority, so Non-Attainment NSR issues are not relevant to the Federal PSD Permit in any event.

Comment XVIII.4. – NO₂ Impacts and Compliance With California Ambient NO₂ Standard:

The Air District received comments regarding whether the project's NO₂ emissions, in addition to background concentrations, would cause an exceedance of California's new NO₂ standards. The comments noted discrepancies among some of the permitting documents wherein the District's current estimates indicate that project impacts plus background will not cause an exceedance of the California NO₂ standard, but earlier estimates had shown levels above the new NO₂ standard. The comments claimed that the Air District's current position is was not adequately explained, and stated that the District should provide a full analysis demonstrating compliance with the CA NO₂ standard as part of the PSD permit process.

Response: California NO₂ standards are not incorporated in the Federal PSD Permit requirements. For Federal PSD purposes, the facility is required to demonstrate that it will not cause or contribute to a violation of the Federal NAAQS for NO₂ (among other requirements). That demonstration was made in the Air Quality Impact Analysis for this project, and the Air District did not receive any comments suggesting that the NO₂ element of that analysis was incorrect.

The District notes, however, that although the California NO₂ standard is not part of the Federal PSD permitting process, it is an important air quality standard that was addressed as part of the

state-law permitting review for the facility. The project's NO₂ impacts were analyzed in the state-law permitting process, and the analysis found that the proposed facility will not cause an exceedance of the new California NO₂ standard. The analysis showed that the maximum potential NO₂ impact from the project will be 130 µg/m³. When added to background concentrations of 130 µg/m³, total concentrations will be less than new California standard of 338 µg/m³. The reason for the discrepancy noted between this analysis and earlier estimates of NO₂ impacts is that earlier NO₂ modeling was performed using the model ISCST. EPA has made that model a non-guideline model and it has been replaced with the AERMOD, the current EPA guideline model. While previous modeling was performed while ISCST was the guideline model, the results presented in this analysis are made with AERMOD. The Air District published this further information and explanation in the Additional Statement of Basis (*see* pp. 83-84) and did not receive any further comment during the second comment period.

Comment XVIII.5. – Compliance with CEC and Authority to Construct Monitoring Requirements:

The Air District received comments noting a condition of the Authority to Construct regarding the installation of equipment for emissions monitoring and questioning whether this or other conditions of the Authority to Construct have been completed yet.

Response: The applicant has not commenced construction at this time, and so the Air District does not believe that these conditions have been completed at this time. In particular, the facility has not yet been built and so there is nothing to install the monitoring equipment on. The applicant will become subject to these conditions at the appropriate time as it goes forward to build and operate the facility. This comment does not appear to refer to anything relevant to the Federal PSD permit requirements.

Comment XVIII.6. – Compliance with CEC Condition AQ-SC10:

The Air District received comments questioning whether the District has complied with Condition AQ-SC10 of the CEC's license, and whether the District could be compelled to comply with this condition.

Response: Conditions in the CEC license apply to and are binding on the project owner, not on the District. Since the District will not be building or operating the facility, the District cannot comply with this condition, which by its terms is inapplicable to the District. For the same reasons, the District could not be compelled to comply with the condition. Moreover, the condition allows an optional alternative for the facility in lieu of satisfying other conditions of certification, and so it does not appear that even the project applicant could be compelled to comply if it chose not to select this alternative. The condition will simply authorize alternative ways to comply with the license, not mandate that the facility utilize any of the alternative means of compliance. And finally, conditions in the CEC license are state-law requirements and are not a part of the Federal PSD permitting process. For all of these reasons, the Air District finds nothing in these comments that is relevant to the Federal PSD permit requirements.

Comment XVIII.7. – California Environmental Quality Act Issues:

The Air District received several comments regarding the facility's compliance with CEQA. Some comments suggested that the issuance of a federal PSD Permit is subject to CEQA, and

requested that the District process the Federal PSD permit consistent with the requirements of CEQA. Some comments also implied that the CEC can no longer be the CEQA lead agency for the project since that agency's permitting action was completed, and its permit record closed, some time ago. Some comments cited CEQA Section 15154 to suggest that the District should assess airport impacts and air-quality impacts to in-flight receptors. Other comments criticized the CEC CEQA-equivalent environmental review process as a poor substitute for CEQA, and also criticized the way the CEC has handled its environmental review responsibilities for this facility, in particular with respect to sensitive species issues. Some comments stated that the District had properly relied on the CEC's CEQA-equivalent environmental analysis in its state-law permitting actions in 2007, but claimed that the Air District should conduct additional CEQA analysis before issuing the Federal PSD permit. These comments claimed that the project has changed since it was approved by the CEC and that the Air District should therefore undertake additional CEQA analysis at this point as part of the Federal PSD permitting process.

Response: The issuance of a Federal PSD permit is not subject to CEQA. The Federal PSD Permit is a federal permit issued under the federal Clean Air Act and is not an action taken pursuant to California law. CEQA applies to this facility through the California Energy Commission licensing process, which includes a thorough environmental impact analysis that is the equivalent of the CEQA environmental impact analysis process. The Commission undertook that analysis, which included many public hearings and the review of a large amount of evidence and testimony regarding a broad range of potential environmental impacts. As a result of the comprehensive review, the CEC found that, with the required mitigation, there will be no significant environmental impacts.³⁸⁷ The project has therefore fully complied with all CEQA requirements, and so CEQA would not provide grounds to object to the project even if CEQA were something that is required for issuance of a Federal PSD Permit.

Comment XVIII.8. – Emissions Offsets and ERCs Identified in the Determination Of Compliance:

The Air District received comments questioning whether the facility's use of emission reduction credits to satisfy its Non-Attainment NSR emissions-offsetting obligations complies with Federal PSD permitting requirements, and whether doing so will protect air quality. In particular, these comments questioned whether the credits used should have been generated in the same location as the facility and whether they are sufficiently "contemporaneous" to satisfy the Non-Attainment NSR emissions-offsetting requirements. Some comments also claimed that the facility will be providing 134.6 tpy of NO₂ Emission Reductions Credits, but that this amount will not be sufficient to offset the emission increases from the project. These comments divided the total offsets by 365 to create a "daily" offset amount, and noted that this is lower than the daily emissions limit in the permit. Finally, some comments also questioned whether some of the credits identified in certain permit documents were validly created. They noted that certain information regarding the background of one of the ERC banking certificates is not available, and questioned why some of the specific credits identified for the facility are different than those identified in the CEC decision. Some comments claimed that some ERCs identified for this project have already been pledged to another Calpine project.

³⁸⁷ See 2007 Energy Commission Decision, *supra* note 16, p. 2 finding 3.

Response: Emission offsets are not a part of the Federal PSD Permit; they are required under State law under the District’s non-attainment NSR permit program. The Environmental Appeals Board expressly stated that offsets and Emission Reduction Credits are a “Non-PSD Issue” and not something that the Air District is required to address on remand. (*See* Remand Order, Slip. Op. at pp. 39-40 (“ERCs are a product of District Regulation 2-2-302, and thus a California state law, not a federal PSD requirement.”).) The commenters’ concerns about the provision of ERCs therefore do not implicate any Federal PSD Permit issues.

The commenters should rest assured that the ERCs for this facility satisfy all requirements of the District’s NSR permitting program under state law, however. The Air District’s offset and ERC requirements in its NSR Rule require that new facilities of more than a certain threshold size obtain offsets from reductions of other sources to counterbalance new emissions from the new facilities. In appropriate circumstances, the new facilities are required to obtain more offsets than the new emissions they will cause. In this way, new development can go forward while still ensuring consistency with the Bay Area’s goals of meeting all ambient air quality standards. The Air District’s rules allow facilities to use credits generated by reductions at facilities that have previously shut down to offset new emissions. This allows some flexibility where old facilities are not shutting down at the exact point in time when new facilities are starting up, but it still achieves the same air quality benefits because the emissions reductions from a closed facility have the same effect going forward regardless of whether the facility closed in 2010 or in some earlier year. The Air District’s rules also allow the use of reduction credits that may not have occurred at the exact same location as the new facility as long as they are from within the Bay Area region. Again, this allows for some flexibility where there are no existing facilities being shut down at the exact site of a new project, but is still consistent with the goals of achieving compliance with region-wide air quality concerns. The Air District’s rules have been reviewed by the US Environmental Protection Agency and have been approved as consistent with the requirements of the federal Clean Air Act.

As the Air District has determined in its permitting analysis regarding the Non-Attainment NSR permitting for this facility, the Russell City Energy Center is subject to the offset/ERC requirements in the Air District’s NSR Rule (Regulation 2, Rule 2), and will submit ERCs sufficient to offset its new emissions as required by that Rule. The commenters correctly note that for NO_x these ERCs will offset the facility’s new emissions in the amount of 134.6 tons per year. There is no “daily” offset requirement, however, as it would be unworkable to require facilities to find offsets from facilities that have shut down that exactly matched the new facilities’ daily emissions profile. For example, for a factory that operates 5 days a week and is shut down on weekends, it would be unworkable for it to have to find credits from another facility that operated on the same daily schedule to ensure that daily emissions are offset. And such daily matching is not necessary to ensure the air quality goals of the region-wide offset program, as on a regional basis the variations in daily operating scenarios of specific facilities will average out over the region as a whole to ensure a general decline in total emissions on a daily, weekly, monthly and annual basis.

Furthermore, the facility has identified sufficient ERCs to satisfy its offset requirements. Some older documents may include outdated information regarding the ERCs to be used for this facility because the Air District authorized the applicant to swap certain ERCs between Russell

City and another plant in 2007. The swap replaced ERC Certificate No. 815, which was generated in Hercules, with certificates Nos. 602, 687, and 877, which were generated in Oakland, San Leandro, and Hayward, respectively. Although the credit from Hercules was useable at Russell City because both locations are within the same Air District, this swap resulted in the use of credits at Russell City that were generated even closer to the location of the new facility's emissions. In addition, although certain information about the creation of one of the credits may not be available at the current time, that does not mean that the credit is invalid for offsetting purposes. ERCs are subject to careful scrutiny when they are created, and when they are approved they are recorded in the Air District's offsets "bank". At that point a "certificate" is created to track the offsets, and that certificate must be surrendered when the credit is used (and the certificate is canceled so the credit cannot be used again elsewhere). The submission of the certificate from the bank will ensure that the credit being provided represents real emission reductions generated by shutting down another facility elsewhere in the region in an amount represented by the certificate, even if the exact details of the facility that was shut down are not known.

XIX. OTHER ISSUES NOT RELATED TO FEDERAL PSD PERMIT REQUIREMENTS

The Air District also received a large number of comments relating to issues or legal requirements that are not part of the Federal PSD program and are thus not part of the Air District's review of the proposed facility. Since such issues are not a part of Federal PSD permitting, these comments have no bearing on the Air District's determination with respect to this permit. The Air District appreciates the public's interest in these issues, however, and agrees that many of the comments touch on important aspects of the project, albeit ones that are addressed under different regulatory regimes. The Air District is therefore responding to these public comments, even though they are unrelated to the Federal PSD permit.

Comment XIX.1. – Endangered Species Act:

The Air District received comments suggesting that the facility could adversely impact endangered species, in particular through impacts on wetland areas near the facility. Some comments stated that the District must refrain from issuing a final PSD permit until the Fish & Wildlife Service ("FWS") has determined that project will not adversely affect any endangered species. Some comments claimed that a full Biological Opinion by the FWS is required to ensure the protection of sensitive species and their habitats, which they claimed would be significantly and negatively affected by the facility. The comments specifically cited potential nitrogen deposition impacts, noise impacts, and acid rain impacts as potentially harmful to sensitive species and their habitats. Some comments also stated that the Air District will need to conduct an analysis of the impacts of CO₂ emissions on particulate matter and ozone levels in order for EPA and FWS to conduct their Endangered Species Act consultation and review.

Response: The Endangered Species Act review for this project is not directly a part of the Federal PSD Permit process. EPA must of course comply with its ESA obligations before the permit becomes final, but that is a separate legal requirement from the PSD permitting process. (*See* Remand Order at pp. 40-41.) The Air District is therefore not required to respond to comments on ESA issues – those comments should be directed to EPA Region 9.

Endangered species issues are obviously important, however, and the Air District has been cooperating with EPA Region 9 to assist in ensuring that endangered species issues are fully addressed. EPA and FWS have conducted a comprehensive analysis of endangered species concerns here as part of their consultation and ESA review, which took into account all potential impacts from the facility on sensitive species and their habitats. FWS and EPA have concluded that the project will not likely adversely affect any endangered species or their critical habitats.³⁸⁸ Based on the findings by these two expert agencies, the Air District disagrees that the facility will have any adverse impacts on endangered species or their habitats.

Comment XIX.2. – National Environmental Policy Act:

The Air District also received comments asking whether the proposed permit complies with the federal National Environmental Policy Act ("NEPA").

³⁸⁸ *See* EPA ESA Consultation Letter, *supra* note 341; USFWS ESA Consultation Letter, *supra* note 341.

Response: EPA has made clear that PSD Permits are not subject to the environmental impact statement provisions of NEPA.³⁸⁹ Issuance of the Federal PSD permit does not violate NEPA because the statute is inapplicable. The project is subject to a CEQA-equivalent review under state law, however, which is at least as thorough and rigorous as a NEPA analysis. The potential for environmental impacts from the project has been studied in great detail, and with the mitigation that will be required there will be no significant environmental impacts.

Comment XIX.3. – Other Federal Statutes:

The Air District received comments suggesting that the facility may be inconsistent with statutes such as the Coastal Zone Management Act, the Clean Water Act, the Migratory Bird Treaty Act, the Magnus-Stevens Act, and other federal statutes in general.

Response: The PSD Permit ensures compliance of the proposed facility with the PSD provisions of the Clean Air Act. To the extent that other statutory provisions apply to the facility, compliance is ensured through the compliance mechanism specific to those statutes, not through PSD permitting. For example, as noted above ESA compliance is ensured through consultation between EPA and the US Fish & Wildlife service and is not a part of the PSD permit process (although the ESA consultation process can be useful in informing the PSD air quality impact analysis, as happened here). Similarly, to the extent that the project implicates any CWA issues, compliance would be ensured through the CWA permitting processes. These additional statutes are not part of the Air District's PSD permit review. (*See* Remand Order at p. 41.)

The Air District notes that the comments did not identify any areas in which these other statutes impose any applicable requirements on the proposed facility, or that construction of the facility would be inconsistent with any of these other statutes, and the District is not aware of any way in which the facility would be inconsistent with any applicable requirements under these statutes. But even if the comments had identified some way in which the facility would be inconsistent with an applicable provision of these statutes, the appropriate avenue to address such issues would be through the appropriate permitting provisions of those statutes (or other applicable avenues provided by those statutes to ensure compliance). Potential inconsistency with any of these statutes (to the extent any existed) would not be a reason to modify or deny the federal PSD permit here, and the comments have not stated any reason why the District should do so based on these statutes.

Comment XIX.4. – Coastal Management Concerns:

The Air District received comments suggesting that issuance of a Federal PSD permit would be inconsistent with the San Francisco Bay Coastal Management Program Assessment and Strategy and the homepage of the NOAA Office of Ocean and Coastal Management.

Response: Again, to the extent that there are legal requirements applicable to this facility under statutes addressing coastal management issues, those concerns would be addressed directly under

³⁸⁹ *See* 40 C.F.R. § 124.9(b)(6); *see also, e.g., In re Knauf FiberGlass, GmbH*, 8 E.A.D. 121, 171 (EAB 1999); *In re Kawaihae Cogeneration Project*, 7 E.A.D. 107, 129 (EAB 1997).

the applicable regulatory program. Coastal management concerns are not part of the Federal PSD permit program. Moreover, the comments did not identify any specific regulatory requirements regarding coastal management issues that the facility may not be complying with, and the Air District is not aware of any. For all of these reasons, there is nothing in these comments suggesting that the Federal PSD permit should not be issued.

Comment XIX.5. – National Register of Historic Places:

The Air District received comments claiming that salt ponds near the proposed facility’s location are a rural historic landscape. The comments suggested that the facility would not be consistent with the National Register of Historic Places.

Response: Concerns about impacts to historical resources are addressed through mechanisms such as the CEC’s CEQA-equivalent environmental review process, and not through the federal PSD permitting process. Historic resource concerns are not part of the Federal PSD permit program. Moreover, the comments did not identify any specific regulatory requirements regarding historical resource issues that the facility may not be complying with, and the Air District is not aware of any. For all of these reasons, there is nothing in these comments suggesting that the Federal PSD permit should not be issued.

Comment XIX.6. – Hazardous Air Pollutant (HAP) Emissions Under CAA Section 112:

The Air District received comments suggesting that it has failed to take into consideration MACT standards for Hazardous Air Pollutants (“HAPs”) pursuant to Section 112 of the Clean Air Act, 42 U.S.C. section 7412. The comments stated that the Air District has not determined how much HAPs the facility may emit, and so it is impossible to determine if the facility will be subject to the Section 112 MACT standards. The comments stated that the Air District must address Section 112 compliance as part of the PSD Permit review.

Response: The review of MACT requirements under Section 112 of the Clean Air Act is a separate requirement from the Federal PSD requirements under Section 165 of the Clean Air Act. Per Section 112(b)(6), Section 112 Hazardous Air Pollutants are specifically exempt from PSD permitting under Section 165. For this reason, Section 112 MACT review is not normally undertaken within the context of a Section 165 PSD permitting proceeding. But regardless of whether Section 112 MACT issues need to be addressed as part of the Federal PSD permit review, the issue is irrelevant here because the facility is not subject to MACT requirements under Section 112. The facility will not emit more than 10 tons of any Section 112 HAP or 25 tons of all HAPs combined.³⁹⁰

Comment XIX.7. – 40 C.F.R. Section 60.11(d):

The Air District received comments stating that 40 C.F.R. section 60.11(d) was not specifically addressed in the permit conditions. This regulation is a general New Source Performance Standard (“NSPS”) general provision requiring that affected sources, including air pollution

³⁹⁰ See December 8, 2008, Statement of Basis at pp. 14-15, Table 6. Note that ammonia, which is listed in Table 6 and was included in the Air District’s Health Risk Assessment, is not a Section 112 Hazardous Air Pollutant. See CAA Section 112(b)(1); 40 C.F.R. § 61.01.

control equipment, shall to the extent practicable be operated and maintained in a manner consistent with good air pollution control practice for minimizing emissions.

Response: The applicability of NSPS requirements to this facility was addressed in the December 8, 2008, Statement of Basis (*see* p. 65). To the extent that this general NSPS requirement is relevant to the PSD review as an applicable emissions standard or standard of performance, the facility will be required to comply with it through the applicable permit conditions requiring emissions to be minimized to the greatest achievable extent as discussed in the various BACT analyses for the project. Air pollution control equipment that the facility will use to comply with these requirements (*e.g.*, the SCR system) will have to be operated and maintained in a manner consistent with good air pollution control practice in order to keep the facility's emissions within these limits. The comments did not identify any information to suggest that the facility will not comply with the requirements of 40 C.F.R. section 60.11(d), and the Air District is not aware of any. The Air District has therefore concluded that the facility will comply with this requirement, to the extent that it is an applicable requirement for purposes of PSD review.

Comment XIX.8. – Noise Impacts:

The Air District received comments claiming that noise from the facility could harm sensitive species and habitats in the vicinity of the project.

Response: Noise is not one of the environmental impacts that is addressed through the Federal PSD program as it is not related to air pollution or air-pollution related concerns like soils and vegetation impacts. Noise concerns are important, but they are addressed through other mechanisms such as the Energy Commission's CEQA-equivalent environmental review. With respect to potential noise impacts on endangered species, those concerns are also addressed under the Endangered Species Act and in the case of this facility through the Endangered Species Act consultation process between EPA and the Fish & Wildlife Service ("FWS"). Here, FWS considered information provided by the applicant concerning noise impacts from the project and, as a result of EPA's informal consultation, the applicant has agreed to submit the Construction Noise Mitigation Plan required by the Energy Commission license to FWS.³⁹¹ The FWS has concluded that noise levels from the project, both from construction and operations, will not adversely affect any sensitive species or critical habitat.³⁹²

Comment XIX.9. – Potential Hazards to Aviation:

The Air District received comments expressing concern about the potential for thermal plumes and pollutant emissions from the facility to impact aircraft and aircrews and passengers. The comments claimed that these concerns will limit airspace use around the facility, which they claim is already limited by a number of factors. The comments claimed that the CEC's staff

³⁹¹ *See* Letter from Barbara McBride, Director, Environmental Health and Safety, Calpine Corporation, to Weyman Lee, P.E., Senior Air Quality Engineer, Air District, June 26, 2009, re: Submission of Supplement to Russell City Energy Center's Application for Prevention of Significant Deterioration Permit to Require Approval of Certain Construction Plans by U.S. Fish and Wildlife Service.

³⁹² *See* USFWS ESA Consultation Letter, *supra* note 341, at p. 3.

recommended against approving the proposed facility based on aircraft hazard concerns. Another commenter supported the project and stated that there would be no adverse impacts to aircraft or airport operations.

Response: The Federal PSD Program is designed to address certain air quality issues, not to address safety issues such as potential hazards to aviation and aircraft operations. Safety issues such as these are obviously a very important public concern and there are comprehensive regulatory requirements in place to address them, but the Federal PSD Permit is not the mechanism to do so. Such concerns could potentially have an impact in a Federal PSD BACT analysis if there was a choice between alternative control technologies that had greater or lesser safety impacts, but that is not the case here. None of the comments has provided any information to suggest that different control technologies should be used or that permit conditions should be changed based on the potential for aviation hazards.³⁹³

Moreover, the potential for aviation hazards was examined in detail by the Energy Commission during the licensing proceedings for the facility. The Commission reviewed a sophisticated analysis of vertical plume velocities and a 2006 FAA study entitled “Safety Risk Analysis of Aircraft Overflight of Industrial Exhaust Plumes”, and concluded that the FAA would characterize this risk as extremely remote and within acceptable ranges. The Energy Commission therefore found that the impact from potential aviation hazards would be less than significant.³⁹⁴ The Energy Commission similarly found that restrictions on airspace as a result of the facility would be less than significant. While it may be true that CEC staff recommended against the project because of aviation issues, the Commission disagreed and concluded that these were not significant concerns because they could be mitigated, as recommended by the FAA, by pilot notification, among other reasons. This considered analysis by the Energy Commission is how such issues are addressed, not through the Federal PSD program.

Comment XIX.10. – Impacts To Operations at Area Airports:

The Air District received comments claiming that the facility would not be compatible with local airport operations, including Oakland International Airport and in particular Hayward Executive Airport. The comments cited commitments made by the City of Hayward to remove and mitigate airport hazards and to ensure compatible land uses around the airport. The comments requested that the FAA evaluate the economic impacts of the facility on the Hayward Executive Airport and other airports in the region. The comments also suggested that the FAA, CEC and California Department of Transportation should develop guidelines for assessing power plant siting near airports, rather than addressing the issue on a project-by-project basis. Another commenter supported the project and stated that there would be no adverse impacts to aircraft or airport operations.

³⁹³ Note that the Air District addressed concerns about ammonia emissions on air crews and passengers, which was relevant to the selection of SCR as the NO_x control technology, in Section IV above and found that it would not have any significant impacts that could affect aviation. The Air District also addressed the issue of toxics emissions generally in Section XIV and found that they would not cause any significant health risks to air crews or passengers.

³⁹⁴ See 2007 Energy Commission Decision, *supra* note 16, at pp. 179-88.

Response: The Federal PSD Program is designed to address certain air quality issues, not to address issues regarding the compatibility of different land uses. Those types of issues are considered by the Energy Commission in its siting decisions where it determines the location of and need for new power generation facilities. The Air District would support the development of guidelines for power plant siting near airports to help in siting decisions, but such issues are not related to Federal PSD permitting.

Comment XIX.11. – Generalized Support For and Opposition To Project:

A number of commenters simply stated that they are opposed to the project, without stating any way in which the project would be inconsistent with the Federal PSD Requirements. Some stated that they opposed new power plants such as this, and some stated that no new fossil-fuel fired facilities should be built. Some stated that they were not necessarily opposed to new fossil-fuel fired power plants, but that they should not be sited at this location. Some stated simply that they want the Air District to deny the PSD permit for this facility. In addition, the Air District also received a number of countervailing comments supporting the siting of facility at this location.

Response: The Air District defers to the Energy Commission regarding what types of electrical generating capacity should be provided at what locations to best serve California's electrical grid. The Air District therefore refers commenters who are generally unsatisfied with the decision to site a power plant at this location, or to license a fossil-fuel-fired plant at a time when renewable electricity sources have received renewed emphasis, to the Energy Commission. The Air District's role in the approval process for new power plants is to review them to ensure that they will comply with all applicable air quality regulatory requirements if the Energy Commission approves them. The Air District has done so here with respect to the Federal PSD requirements and has found that this facility will satisfy all such requirements and is eligible for a Federal PSD Permit.

Comment XIX.12. – Project Aesthetics:

Some comments objected to the facility on generalized aesthetic grounds, suggesting that the facility would not fit in with the surrounding visual background.

Response: Project aesthetics are not part of the Air District's review for the Federal PSD Permit. Local land use concerns such as this should be addressed to the City of Hayward, and to the CEC which has approved the siting of the facility at this location.

Comment XIX.13. – Need for the Project:

The Air District received comments questioning whether the facility was really needed to provide power for the Bay Area. Some comments suggested that the need for power was on the West side of the San Francisco Bay, and that the facility should not be built on the East side to serve this demand. Some comments suggested that assertions about the demand for electricity are part of a "scam" and are not true. Some comments suggested that an increase in demand should be met with measures to decrease demand, not with an increase in supply. Some suggested that an increase in demand should be met through conservation or cleaner sources. Some comments suggested that if this facility is built it will prevent 600 MW of renewable power from being developed.

Response: The demand and supply of electricity in California is overseen by other expert agencies such as the California Energy Commission, the California ISO, and the California Public Utilities Commission. The Air District defers to the judgment of expert agencies such as those in determining how demand will be met and what new generating capacity is needed and how it should be provided. The Air District therefore does not take a position on the need for this facility and whether this facility is the most appropriate way to meet that need. But in any event, these issues are not directly related to air quality and whether the facility will meet applicable air quality-related regulatory requirements, and are not relevant to the PSD permitting analysis.

Comment XIX.14. – Use of New Facility to Replace Older Facilities:

The Air District received several comments regarding a statement in its Associated Growth analysis that electricity from the proposed facility will displace power from older, less efficient sources of electricity elsewhere in the region. These comments criticized this statement because they claimed that the District does not have any decision-making authority over closing old power plants and cannot know for certain whether older facilities will be shut down as a result of this new facility (and if so whether they will be in the same area as the new facility). The comments stated that the Air District should take steps to ensure that the public does not misunderstand the District’s role in deciding whether to close older facilities. In contrast to these comments, the Air District also received other comments that supported the Air District’s statement and asserted that the addition of the facility will allow older plants to be taken off-line.

Response: The Air District agrees that it does not know for certain whether older facilities will be able to be shut down as a result of the new Russell City Energy Center. The Air District made the statement that is the subject of these comments because, in general, it expects that at least some of the additional capacity from this facility will be used to take the place of older facilities. But the extent to which this facility will replace existing facilities (if at all) is not relevant to the Federal PSD requirements, and so it makes no difference to the Air District’s permitting decision which position is correct. Nothing in the Federal PSD regulations makes the issuance of a permit for a new facility contingent on closing down an older facility.

Moreover, the Air District also notes that the CEC recently decided that, because of the unique nature of how power plants are dispatched as part of an integrated grid system, the greenhouse gas emissions from a proposed power plant should be assessed on a system-wide basis for purposes of CEQA.³⁹⁵ Importantly, the CEC found that, because a plant’s position in the dispatch order is determined by its “heat rate”, which is, in turn, “directly correlated with emissions (including GHG emissions), *when one power plant runs, it usually will take the place of another facility with higher emissions that otherwise would have operated.*”³⁹⁶ Thus – in the case of a similar facility with similar intended dispatch to the applicant’s proposed Russell City Energy Center and a similar “heat rate” – the CEC found that operation of the facility would, in

³⁹⁵ Avenal Energy Commission Decision, *supra* note 58, at pp. 103-104, 113 (“The GHG emissions from a power plant’s operation should be assessed in the context of the operation of the entire electricity system of which the plant is an integrated part.”).

³⁹⁶ *Id.*, p. 104, emphasis in original.

fact, take the place of a less efficient plant and thereby result in system-wide reductions in emissions, even if the less efficient plant would remain in service and not be permanently decommissioned as a result of the new facility's operation.³⁹⁷ While the extent to which the proposed facility might replace older plants is not germane to the Air District's decision concerning issuance of the PSD permit, the District notes that the CEC's decision would tend to support that addition of a highly efficient plant such as the proposed Russell City Energy Center to the grid is likely to lead to a reduction in the operation of older, higher polluting plants and, as a consequence, in system-wide emissions.

Comment XIX.15. – Alternatives to the Project:

The Air District received comments claiming that it should consider other alternatives to the project, such as solar power or reducing demand so that the facility would not have to be built.

Response: As noted elsewhere in this Response to Comments document, the Federal PSD Permit analysis does not evaluate alternatives that would “redefine” the project by changing its fundamental purpose and basic design. This means that the Federal PSD Permit review does not look at alternatives such as solar power, demand management, or other similar alternatives. That does not mean that such considerations are unimportant, however, and they can appropriately be taken into account in the overall permitting of the facility. But this type of review of alternatives is undertaken in other forums such as the CEC's CEQA-equivalent environmental review process, not through the Federal PSD permitting process.

Comment XIX.16. – Job Creation:

Some comments supported the project because it will create jobs for the construction workers who will build the facility and the operations staff who will run it. Other comments suggested that renewable energy projects create more jobs than facilities such as this one.

Response: The Air District is supportive of creating as many jobs as possible, consistent with environmental protection and other important societal goals, but job creation is not an issue addressed in the Federal PSD Regulations. It was not a part of the Air District's analysis supporting the proposed permit, and it has no impact on the Air District's decision to issue the final permit.

Comment XIX.17. – Consistency With Other Air Quality Regulatory Programs:

The Air District received comments objecting to the issuance of a permit for this facility as inconsistent with other air quality regulatory programs, such as the “smog-check” program for automobiles, the Air District's asbestos regulations, and the District's recently adopted regulations prohibiting wood burning in fireplaces on “Spare the Air” nights.

³⁹⁷ *Id.*, pp.105-106 (finding that it is not necessary that there be evidence showing that aging power plants are decommissioned as a consequence of new power plant approval for the CEC to determine that the new plant's environmental impacts would amount to an overall reduction in emissions). The CEC also rejected arguments that the addition of highly efficient natural gas-fired power plants would “crowd out” new renewable energy sources, instead finding that the addition of such highly efficient, dispatchable plants will be needed to successfully integrate renewable generating sources into the grid. *Id.*, pp. 110, 113.

Response: The Air District disagrees that there is any inconsistency in its asbestos, wood-burning, or any other regulations and its permitting of this facility. With respect to wood burning in particular, the San Francisco Bay Area is out of compliance with the National Ambient Air Quality Standards for short-term levels of fine particulate matter (PM_{2.5}). The Air District needs to respond to this situation to protect the air that we all breathe. The Air District identified wood burning in fireplaces as a major contributor to unhealthy PM_{2.5} levels on cold, still winter evenings when PM_{2.5} levels are the highest, and so it adopted its wood burning regulations to cut down on unhealthy wood smoke during these periods. This is similar to the approach that EPA's PSD program takes to major facilities such as this one, requiring stringent emission controls as described throughout this document. With these stringent controls in place, this power plant will generate electricity to power the grid burning clean natural gas and with the lowest amount of air pollution achievable using current state-of-the-art technology.

Comment XIX.18. – Effect on Property Values:

The Air District received comments stating that the project will harm property values in Hayward, and suggesting that the Air District should consider impacts on property values in its PSD permit analysis.

Response: The District does not have any information on property values in Hayward. The District is not aware of any PSD permit requirement that is based on property values, and the commenters have not cited any. To the extent that the project will have the potential to negatively impact property values in Hayward, such concerns should be addressed to the City and to the Energy Commission in the context of siting the project at this location. Impacts to property values are not an element of the PSD permit review process.

Comment XIX.19. – Wastewater Storage:

The Air District received comments stating that there appears to be limited wastewater storage available for the project.

Response: The availability of wastewater storage is not an element of the Federal PSD permitting program. The Air District is not aware of any potential problems at the facility with wastewater storage, and the comments did not provide any specific information that there may be a problem with wastewater storage. But to the extent that there are any grounds for such a concern, they should be addressed to the appropriate agency with regulatory jurisdiction over this issue instead of being raised in the Federal PSD permit process.

Comment XIX.20. – Flood Protection:

The Air District received a comment stating that the water level in the San Francisco Bay is rising because of global warming. The comment further stated that the facility is located in a flood plain and will eventually be below the surface level of the Bay, and asked who will be responsible for mitigation measures to keep the facility from being submerged.

Response: To the extent that flood control measures will be required at this facility because of rising water levels, it is not clear at this point what measures could be needed and how they would be paid for should they become necessary. The comment seems to recognize this

situation, as it states that criteria for cities and counties to use in assessing these issues are still in the discussion phase. In any event, flood protection issues are not part of the PSD permit review.

Comment XIX.21. – Air District Permitting of Gateway Generating Station:

The Air District received comments alleging that, with respect to a different power plant project known as the Gateway Generating Station, the District has been engaged in a “conspiracy” with PG&E, the project owner, to circumvent PSD requirements for that project. The comments cited written notes prepared by the applicant in that project from a telephone conference between the applicant and Air District staff on August 4, 2008. The applicant’s notes state that the conference included a discussion of whether the District should re-notice the proposed amendments to the facility’s PSD permit for that project in light of the Environmental Appeals Board’s determination in the July 29, 2008, Remand Order in *In re Russell City Energy Co.*, PSD Appeal No. 08-01, in which the EAB criticized certain elements of the District’s PSD notice procedures. The notes indicate that the District was of the opinion that the draft permit amendments for the Gateway facility should be re-noticed in light of that Remand Order. The applicant’s notes also indicate that, according to the applicant’s consultant Mr. Gary Rubenstein of Sierra Research, the applicant believed that it could withdraw its application for amendments to its PSD permit that was currently being processed, and wait to submit the application until after the facility started up. The notes indicate that it was Mr. Rubenstein’s opinion that if the facility had already started up and was operational, the amendments the applicant was seeking would not be considered a “major” amendment for PSD purposes and would not require PSD review. The notes also indicate, however, that there was a concern expressed that such an approach would amount to an attempt to circumvent the PSD requirements and would not be something that the District could support. The comments cited the applicant’s notes in this regard to charge that the District delayed approval of the amended PSD permit to allow the facility to become operational and avoid PSD review, and that as a result the applicant constructed and is operating a facility that does not satisfy applicable PSD regulatory requirements. The comments also noted that the Environmental Protection Agency has issued a Finding and Notice of Violation (“FNOV”) for that project stating that the project was constructed and is being operated in violation of applicable PSD regulatory requirements.

Response: The PSD permit status of the Gateway Generating Station is not relevant to the PSD permitting of the Russell City Energy Center. Nothing in these comments suggests that the Russell City Energy Center will not comply with all applicable PSD permitting requirements, or objects that the Air District should not issue a permit for the Russell City facility. These comments are therefore irrelevant here and do not require a response.

Nevertheless, the Air District wishes to respond to these allegations in order to set the record straight with respect to the permitting of the Gateway Generating Station. The Air District strongly denies that it is complicit in any Federal PSD violations by the PG&E, the project owner. To the contrary, it was the Air District that first brought the permitting irregularities regarding Gateway that form the basis of the enforcement action that is now underway to the attention of EPA and PG&E.

When the Air District received the Remand Order from the Environmental Appeals Board, it started reviewing its notice procedures for Federal PSD permits in order to ensure that the

District would comply with the EAB's requirements going forward. This review of the Federal PSD notice procedures was most directly applicable to the Russell City Energy Center, since it was the facility that was the subject of the Remand Order, but it was also applicable to the Gateway facility because the Air District had recently noticed a proposed PSD permit amendment for that facility to increase the facility's CO emissions limit (among other changes). District staff discussed the Federal PSD notice requirements, and the implications of the EAB Remand Order, with PG&E on a number of occasions, including on August 4, 2008. As the consultant's notes indicate, District staff believed that it would be prudent to re-notice the proposed Gateway permit amendment to ensure that it complied with all requirements addressed in the Remand Order. Another subject that District staff discussed with PG&E was whether the amendment would have to be subject to Federal PSD review at all, or whether it could be treated as a minor modification not triggering PSD review. As the notes from the August 4, 2008, meeting indicate, Mr. Rubenstein opined that PG&E could simply withdraw its application and then resubmit it as a minor modification after the facility had completed construction. The Air District objected to this approach however, and indicated that it would not be able to support this approach as it would amount to impermissible circumvention of the applicable PSD requirements. The Air District therefore maintained its position that PSD permit review would be required, and continued working on the permit with the expectation that a further proposed permit amendment would be re-noticed in accordance with the Remand Order and all applicable Federal PSD permit requirements. Before the Air District could re-notice a further proposal, however, PG&E withdrew its permit application. PG&E stated that it had found that it could meet the existing CO limits in its permit, and would not need the increases it had applied for after all.

In addition to reviewing its PSD notice procedures when it received the Remand Order, the Air District also undertook a thorough review of all other aspects of its PSD permitting procedures to determine if there were any other areas in which they may not strictly conform to the requirements of 40 C.F.R. Section 52.21. One area that the Air District identified concerned permit expiration. Section 52.21(r)(2) provides that a Federal PSD permit expires after 18 months if construction has not commenced, whereas Air District regulations provide that a District Authority to Construct does not expire for two years. In light of this discrepancy, the Air District is ensuring that it informs all PSD permit recipients of the 18-month expiration provisions at the time of permit issuance. The Air District also reviewed the permitting history for the Gateway Generating Station in light of this discrepancy, and discovered that it had been renewing the Gateway PSD permit at two-year intervals on the timetable created by Air District regulations, and not every 18 months as required by 40 C.F.R. Section 52.21(r)(2). The Air District subsequently informed EPA Region 9 and PG&E of the situation, and EPA Region 9 determined that the Gateway PSD permit had expired and had not properly been extended. EPA Region 9 determined that the facility had therefore been constructed without a current, valid PSD permit, and commenced the enforcement action referenced in the comments.

This record shows that far from being complicit in allowing violations of federal PSD requirements, the Air District has in fact been careful to ensure that all PSD requirements are fully complied with. After receiving the Remand Order and realizing that it was not appropriate to rely on the language in its PSD Delegation Agreement from Region IX indicating that compliance with Air District regulations would satisfy all PSD requirements as well, the Air

District immediately acted to review its PSD permitting procedures and fix any discrepancies. It informed PG&E that it would have to renotice the proposed Gateway permit amendment to ensure PSD compliance. It disagreed with PG&E's consultant's position that PG&E could withdraw its application for a CO increase and resubmit it after construction was complete to avoid PSD review, and ensured that PSD requirements would be applied to any such amendment (although in the end PG&E determined that it would not need the increased CO limits and did not pursue the amendment further). And it brought the irregularities regarding extensions of the Gateway PSD permit to EPA and PG&E's attention, which allowed EPA to bring its enforcement action to cure the alleged PSD violations. Thus, for all of these reasons, the Air District disagrees with the comments suggesting that it is not properly implementing the Federal PSD program requirements and the Delegation Agreement with respect to Russell City, Gateway, or any other facility.

Comment XIX.22. – EPA Enforcement Action Regarding Gateway Generating Station:

The Air District also received comments objecting to the fact that EPA Region 9 is handling claims of PSD non-compliance regarding the Gateway Generating Station through an enforcement action. These comments apparently object to handling claims of PSD violations through an enforcement action because the commenters believe that there is no right to public comment in an EPA enforcement action. These comments are apparently claiming that EPA Region 9 should drop its enforcement action and that the District should undertake a permit proceeding instead as the appropriate means to address claims of PSD violations.

Response: The Air District disagrees with these comments. EPA's enforcement action is the proper mechanism through which to address EPA's claims of violations of the Clean Air Act's PSD requirements. Furthermore, the comments are incorrect that the federal enforcement process does not provide an opportunity for public comment. EPA has provided a public comment opportunity on the Consent Decree that it intends to ask the federal District Court to enter in the case, and members of the public (including some of the commenters on this permit) have in fact submitted comments. The Air District also disagrees that it could do anything in a permit proceeding to address the alleged PSD violations regarding Gateway. The project owner does not currently have a PSD permit application pending with the Air District, and so there is nothing for the District to act on in terms of imposing PSD permit conditions.

Comment XIX.23. – Consistency with AB 32 and Hayward Climate Action Plan:

The Air District received comments stating that the facility is inconsistent with the California Global Warming Solutions Act (AB 32) and the City of Hayward's Climate Action Plan.

Response: Consistency with planning efforts to reduce greenhouse gases generally is not an element of the Federal PSD permitting process. Consistency with AB 32, local climate action plans, and other such plans is something that can be considered in the California Energy Commission's power plant siting process. Questions regarding the consistency with such plans should be raised at the Energy Commission.

Comment XIX.24. – Earthquake Hazard:

The Air District received comments stating that the facility will be located in a seismically active area and will be at risk of suffering from earthquakes.

Response: Earthquake risk is not an element of the Federal PSD permitting process. Concerns about earthquake risk and seismic safety should be addressed in the siting and general environmental review process that is conducted by the California Energy Commission.