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DATE: July 9, 2010

TO: Interested Parties

FROM: Mary Dyas, Compliance Project Manager

SUBJECT: Russell City Energy Center (01-AFC-7C)
Supplemental Staff Analysis of Proposed Project Modifications

On November 18, 2009, the Russell City Energy Company, LLC (RCEC) filed a petition with the California Energy Commission (Energy Commission) to amend the Energy Commission Decision for the Russell City Energy Center. On January 12, 2010, a letter was filed by RCEC eliminating one of the four proposed new laydown areas from the amendment. On June 28, 2010, Staff issued a Staff Analysis of Proposed Project Modification that addressed RCEC Amendment No. 2 modifications to the Conditions of Certification concerning air quality. This Supplemental Staff Analysis provides information pertaining to Staff's analysis of the proposed addition of three laydown and parking areas, and the rerouting of the potable water supply and sanitary sewer pipelines and additional Air Quality analysis.

The 600 megawatt project was certified on September 11, 2002, and amended on October 2, 2007. The project is located in the City of Hayward, Alameda County.

The proposed modifications discussed in this Supplemental Staff Analysis are to (1) add three new land parcels as construction worker parking and construction laydown areas. (their use for this purpose will terminate at the end of construction), and (2) route the potable water supply and sanitary sewer pipelines to connect with the City lines at Depot Road instead of Enterprise Avenue. This proposed route will be shorter and entirely within the existing licensed RCEC parcel. The Project Owner's proposal to update the Air Quality Conditions of Certification to meet current best available control technology (BACT) standards for a number of pollutants, as established by the federal Prevention of Significant Deterioration (PSD) permit, is addressed in the June 28, 2010 Staff Analysis.

Energy Commission staff reviewed the petition and assessed the impacts of this proposal on environmental quality, public health and safety, and proposes revisions as noted in the attached analysis. It is staff's opinion that, with the implementation of the revised conditions in Air Quality and Cultural Resources, the project will remain in compliance with applicable laws, ordinances, regulations, and standards and that the proposed modifications will not result in a significant adverse direct or cumulative impact to the environment (Title 20, California Code of Regulations, Section 1769).

The amendment petition and staff's analyses have been posted on the Energy Commission's webpage at:

http://www.energy.ca.gov/sitingcases/russellcity_amendment/compliance/index.html.

The Energy Commission's Order (if approved) will also be posted on the webpage. Energy Commission staff intends to recommend approval of the petition at the August 11, 2010, Business Meeting of the Energy Commission. If you have comments on this proposed modification, please submit them to me at the address below prior to August 9, 2010.

Mary Dyas, Compliance Project Manager
California Energy Commission
1516 9th Street, MS-2000
Sacramento, CA 95814

Comments and questions may be submitted by fax to (916) 654-3882, or by e-mail to mdyas@energy.state.ca.us.

For further information on how to participate in this proceeding, please contact the Energy Commission Public Adviser's Office, at (916) 654-4489, or toll free in California at (800) 822-6228, or by e-mail at publicadviser@energy.state.ca.us. News media inquiries should be directed to the Energy Commission Media Office at (916) 654-4989, or by e-mail at mediaoffice@energy.state.ca.us.

Enclosure

RUSSELL CITY ENERGY CENTER (01-AFC-7C)
Construction Laydown and Parking

INTRODUCTION

On November 18, 2009, Russell City Energy Center, LLC filed a petition with the California Energy Commission (Commission) to amend the Russell City Energy Center project (RCEC). The Amendment originally proposed the addition of four parcels as construction worker parking and construction laydown areas. On January 12, 2010, RCEC filed a letter withdrawing one of the four proposed laydown areas from the amendment. The three areas will be used temporarily for construction worker parking and material laydown during the construction periods, and their use for that purpose will terminate at the end of construction. The three construction laydown and parking parcels are summarized in Table 1.[1]

Construction Laydown and Parking Table 1
Proposed Additional Parcels

Parcel Name	APN	Street Frontage	Proposed Use	Acreage
Tompkins Parcel	439-0070-014-00	3898 Depot Road	Parking	3.55
Zanette Parcel	439-0070-002-01	3826 Depot Road	Temporary Construction Trailers and Offices, and Parking	1.93
Chess Parcel or Depot Road LLC	439-0070-002-00	South of 3664 Depot Road	Laydown	3.58

Tompkins Parcel

The Tompkins parcel is located on the south side of Depot Road at its furthest western point. The entire property is approximately 4.05 acres in size. The applicant has entered into an option to lease approximately 3.55 acres of the site (excluding the northwestern corner of the property) for temporary storage, parking, and/or material laydown during construction activities associated with the RCEC project. The site is immediately adjacent to the north side of the project site and thus is ideally suited for construction parking.

[1] The June 28, 2010 Staff Analysis incorrectly described the project as requesting four parcels for parking and laydown during construction, but, as noted above, only three areas are requested.

The following properties are adjacent to the Tompkins parcel:

- North: Cabot Business Park. Vacant lot located southwest of the buildings associated with the Cabot Business Park
- East: AAA Truck, which is operated as an auto dismantling and wrecking company
- South: Vacant property identified for future site of RCEC construction
- West: Undeveloped land and the San Francisco Bay

The Tompkins Parcel is currently used as an auto dismantling facility. As such, the site includes a significant stockpile of autos, auto parts and a number of structures that are used for the disassembly of vehicles, which will be cleared.

Zanette Parcel

The Zanette parcel is bounded by a concrete crushing company along the eastern and southern boundaries. An associated parking area extends along the western boundary of the site. A portion of the site (approximately 1.93 acres) that excludes the area of the site currently containing an office trailer and associated parking has been identified for potential use for construction parking, material laydown, and/or trailers and offices during construction activities. The parcel is occupied by Golden Bay Construction Company and is currently used for waste-sorting processes. The parcel is surrounded by the proposed construction site for the RCEC to the south, east, and west. Adjacent properties are:

- North: Cabot Business Park
- East: Vacant lot used for outdoor storage
- South: Land to be developed as the RCEC
- West: Land to be developed as the RCEC

Chess Parcel

The Chess parcel does not have an official street address, but is located immediately south of the property at 3664 Depot Road. The parcel is approximately 3.58 acres in size, but the RCEC will use only approximately 3.06 acres (excluding the driveway on the northwestern edge of the site) for construction material laydown. The parcel is currently a vacant lot used for outdoor storage. Adjacent uses include:

- North: Kamps Propane, adjacent to the driveway directly north of the storage yard
- East: Xtra Lease Inc., operated as a moving trailer rental company
- South: City of Hayward Water Pollution Control Facility
- West: Dorris Auto Wreckers facility

LAWS, ORDINANCES, REGULATION, AND STANDARDS (LORS) - COMPLIANCE

Staff has reviewed the petition for potential environmental effects and consistency with applicable LORS. Based on this review, staff determined that there are no new or changed LORS that would be applicable to the proposed project.

SETTING

The requested addition of construction and laydown parcels does not change the setting applicable to the RCEC project.

ANALYSIS OF ADDITION OF CONSTRUCTION AND LAYDOWN PARCELS

BIOLOGICAL RESOURCES

Tompkins Parcel. This parcel is an active auto wrecking yard and is approximately 4.05 acres in size. The parcel contains several buildings and dozens of automobiles, with the grounds overlain with gravel and asphalt. Currently the majority of the site is utilized and unvegetated. The surrounding areas include other wrecking yards, business parks, and a wastewater treatment plant. The little vegetation that was observed on site included weedy species such as black mustard (Brassica nigra), fennel (Foeniculum vulgare), and Himalaya blackberry (Rubus discolor).

Zanette Parcel. This parcel is approximately 2.0 acres in size and is currently an active storage yard for construction equipment. Until recently this parcel was used as an auto wrecking yard. The property is overlain with asphalt and gravel. The majority of the site is now vacant and not utilized with the exception of an office trailer and several small sheds that are being used for gravel storage.

The little vegetation that was observed on this site occurred on the margins of the parcel and consisted of tumbleweed (Amaranthus albus), black mustard, fennel and English plantain (Plantago lanceolata). Although there were no trees on the parcel, there is a large eucalyptus (Eucalyptus sp.) adjacent to the southwestern side of the parcel.

Chess Parcel. This vacant lot covers approximately 3.5 acres and is characterized by a mosaic of asphalt, gravel and predominantly ruderal vegetation. The surrounding areas include wrecking yards, storage areas and the wastewater treatment plant. Ruderal vegetation present on this site includes black mustard, fennel, Himalaya blackberry, bristly ox-tongue (Picris echioides), wild oats (Avena fatua), and Mediterranean barley (Hordeum marinum ssp. gussoneanum). Scattered coyote brush shrubs (Baccharis pilularis) are also present. Although there were no trees on the parcel, there are a few large ornamental trees adjacent to the southeastern side of the site.

Standards of Significance. Impacts on biological resources are considered significant if one or more of the following conditions could result from implementation of the proposed project:

- Substantial effect, reduction in numbers, restricted range, or loss of habitat for a population of a state or federally listed threatened or endangered species
- Substantial effect, reduction in numbers, restricted range, or loss of habitat for a population of a California special-status species, including fully protected, candidate proposed for listing, California Species of Concern, and some California Native Plant Society (CNPS) list designations
- Substantial interference with the movement of resident or migratory fish or wildlife species
- Substantial reduction of habitat for native fish, wildlife, or plants
- Substantial disturbance of wetlands, marshes, riparian woodlands, and other wildlife habitat
- Removal of trees designated as heritage or significant under County or local ordinances

The petition does not result in any potentially significant, unmitigated impacts to biological resources.

Potential Impacts of Construction Use of New Construction Laydown and Parking Areas. The use of the new laydown and parking areas would result in temporary impacts to vacant urban lots. Although the quality of the land as wildlife habitat is marginal, it could be used seasonally by foraging birds, small mammals, and reptiles.

Special-Status Species. No special-status species have been observed or recorded by past project-specific database searches or surveys for the project area. The new laydown and parking areas do not include unique habitat features that would provide habitat for special-status species not addressed in the 2001 AFC and 2006 Amendment Petition. The new areas increase the temporary disturbance acreage of the overall project slightly. This is not a significant impact, given the poor quality of the habitat. Therefore, no direct or indirect impacts are expected to any special-status species.

Based on the foregoing, these three laydown areas will not result in any potentially significant, unmitigated impacts to biological resources. Additional mitigation measures (beyond those of the Commission Decision, as amended) are not required for this petition. The addition of the new construction laydown and parking parcels does not require changes to the Biological Resources Conditions of Certification.

CULTURAL RESOURCES

The three proposed construction and laydown areas would be located on the Tompkins, Zanette, and Chess parcels. The parcels were surveyed by a cultural resources consultant to the project owner on October 23, 2009. The newly proposed Tompkins,

Zanette, and Chess parcels all had a considerable amount of debris, gravel, concrete, or asphalt covering their surfaces, resulting in poor visibility during the survey. In addition, the towers for the Eastshore-Grant Transmission Line (site P-01-002269), are situated near the southeast corner and northeast corner of the parcel. The transmission line would be avoided by the project, and impacts to the setting of the Eastshore-Grant Transmission Line would not be affected because the project is proposed in an area where there is already considerable industrial development.

No known cultural resources would be affected by the proposed project amendments. There is a potential to discover subsurface archaeological sites or artifacts because the seashore was a likely location for prehistoric and historic habitation, and subsistence activities. Condition of Certification CUL-7 requires monitoring during removal of debris, or ground clearing for areas of the original project and the three newly proposed parcels where visibility was limited during surveys. If the cultural resources conditions of certification are properly implemented, any impacts to newly discovered cultural resources would be reduced to a less than significant level.

Cumulative Impacts. A cumulative impact refers to a proposed project's incremental effect together with that of other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project. (Pub. Resources Code § 21083; Cal. Code Regs., tit. 14, §§15064(h), 15065(c), 15130, and 15355). Reconductoring of the existing transmission line from the Eastshore Substation to the Dumbarton Substation is proposed to facilitate movement of additional electricity supply. Proponents for the Eastshore to Dumbarton reconductoring, and other future projects in the Amendment No. 2 area can mitigate impacts to as yet undiscovered subsurface archaeological deposits to less than significant by implementing mitigation measures requiring construction monitoring, evaluation of resources discovered during monitoring, and avoidance or data recovery for resources evaluated as significant (eligible for the California Register of Historical Resources or National Register of Historic Places). Staff's proposed Conditions of Certification would ensure that the proposed project's incremental effect is not cumulatively considerable.

Conclusions and Recommendations. Amendment 2 would not affect any previously identified cultural resources. Due to poor ground surface visibility, an attempt to survey the ground surface of newly proposed construction/laydown areas did not yield conclusive results regarding the presence of cultural resources. To ensure identification, evaluation, and appropriate mitigation of newly discovered resources, staff has added the three parcels proposed by this amendment to CUL-7. The proposed project changes will not impact known cultural resources. Implementation of the previously adopted cultural resources Conditions of Certification CUL-1 through CUL-7 would serve to mitigate any impacts to newly discovered significant cultural resources.

PROPOSED MODIFICATIONS TO CONDITIONS OF CERTIFICATION.

CUL-7 Prior to any form of debris removal, ground clearing, or grading at the Aladdin Parcel, Tompkins Parcel, Zanette Parcel, Chess Parcel, Transmission Line Route Alternative 2, and portions of Alternative 1 subject to ground disturbance, the CPM shall be informed via e-mail or other method acceptable to the CPM, that debris removal, ground clearing, or grading is about to occur. The project owner shall ensure that the CRS, alternate CRS, or CRM(s) monitors full time (one person monitoring each large piece of machinery) during the removal of old vehicles, storage containers, gravel, debris, and overburden and during grading at the Aladdin Parcel, Tomkins Parcel, Zanette Parcel, Chess Parcel, at Transmission Line Route Alternative 1 locations where ground disturbance is likely, and along Transmission Line Route Alternative 2. If there is a discovery during the removal process, then the Cultural Resources conditions of certification shall apply.

After removal of the various kinds of debris obscuring the ground surface, the CRS shall examine cleared ground as it is revealed, or conduct or oversee an archaeological pedestrian survey of the project site and linear locations not previously surveyed. If there is a discovery during the examination or survey, then the Cultural Resources conditions of certification shall apply. After completion of each examination or pedestrian archaeological survey, and prior to any grading or ground disturbance, a letter report from the CRS identifying monitoring and survey personnel and detailing the examination or survey methods, procedures, and results shall be provided to the CPM for review and approval.

Verification: One week prior to any form of debris removal, ground clearing or grading at the Aladdin Parcel, Tompkins Parcel, Zanette Parcel, Chess Parcel, Alternative 2 transmission line route, and Alternative 1 Transmission Line Route where there may be ground disturbance, the project owner shall inform the CPM via e-mail, or another method acceptable to the CPM, that the debris removal, ground clearing, or grading will begin within one week and that the CRS, alternate CRS or CRM(s) are available to monitor. No later than one week after completion of each cleared earth examination or survey, and prior to any additional grading or ground disturbance, a letter report identifying survey personnel and detailing the methods, procedures, location, and results of the examinations or surveys shall be provided to the CPM for review and approval.

GEOLOGY AND PALEONTOLOGY

The new laydown and parking areas would not result in potential impacts to geological resources or paleontological resources and would not cause geological hazards beyond those analyzed by the CEC during certification. There will be no significant construction or operation disturbance below the ground surface beyond the scope considered in the Commission Decision.

The new laydown and parking areas could involve minor disturbance of areas not considered in the Commission Decision. This disturbance would take place on or at the surface, however, and would be unlikely to affect significant geological or paleontological resources. Furthermore, with the implementation of the mitigation measures contained in the Commission Decision for the project, such as paleontological resource monitoring and worker environmental awareness training, any potential impacts would be reduced to a level of insignificance.

Therefore, no significant impacts to geological or paleontological resources would result from the approval of this Amendment, mitigation measures beyond those stipulated in the Commission Decision are not necessary, and the petition's request for temporary use of additional construction and laydown parcels does not require changes to the Geological and Paleontology Conditions of Certification.

HAZARDOUS MATERIALS MANAGEMENT

Quantities of the chemicals listed in Appendix C to the Commission Decision would not change as a result of the new laydown and parking areas.

LAND USE

The addition of the new laydown and parking areas would not involve changes to the land use findings and conclusions.

NOISE AND VIBRATION

The addition of laydown and parking areas would not involve changes to the Commission Decision's findings and conclusions regarding noise. Although there would be some noise caused by equipment movement, this is a temporary impact that will not be significant.

TRAFFIC AND TRANSPORATION

Three new parking lots/laydown areas (outside of the project site) will be added to the three sites described in the Project (as amended in October 2007). These new sites are located at:

- 3898 Depot Road (Tompkins Parcel). This parcel will be used as a construction material temporary laydown area, and for craft parking. This parcel is contiguous to the site, and material movements will not affect local roadways after initial delivery.
- 3826 Depot Road (Zanette Parcel). This parcel will be used as a construction material temporary laydown area, construction trailers, and for craft parking. This parcel is contiguous to the site, and material movements will not affect local roadways after initial delivery.
- 3664 Depot Road (Chess Parcel or Depot Road LLC). This plot will likely be used for construction material temporary laydown. Deliveries of various types of

construction materials and equipment will come to this yard from outside of the area, and will be transported into the site proper on flatbed trucks as needed.

That represents an increase of 8.5 trucks during peak hours over what was estimated for the original project (10 percent of 25 trips was 2.5), or 17 passenger care equivalents ("PCE").

The impacts associated with the three additional parking and laydown areas will not substantively differ from those identified in the amended Project, because: (1) all additional laydown/parking lot areas are either off Depot Road or Enterprise Avenue, so the same general area as before the addition of these sites will be affected; and (2) the 17 added trucks (in PCE) during the peak hour (34 one-way trips) is less than 1 percent of the existing peak hour traffic on Depot Road. The majority of the increase in truck trips would occur on Depot Road because most of the laydown areas are located there.

The potential minor traffic delays due to the movement of materials and equipment between the construction laydown areas and the RCEC site would slightly increase because of the new construction truck needs but would still remain less-than-significant. Therefore, the proposed changes to the project would not involve changes to the Commission Decision's findings and conclusions regarding traffic and transportation. The minor delays are temporary, less-than-significant impacts. During operations, the proposed changes would not cause any permanent impact because the laydown facilities and the construction trucks would no longer be needed.

VISUAL RESOURCES

The additional laydown and parking areas will not involve changes to the Commission Decision's findings and conclusions regarding visual resources. Appropriate screening of these areas from public view would be required per Condition of Certification VIS-1. Any visual effects from using the laydown and parking areas would be temporary and limited to the construction phase of the project.

WASTE MANAGEMENT

Waste management practices will not differ significantly from those described in the 2001 AFC or applicant's first amendment. No changes in the types or quantities of waste to be generated by construction or operation of the RCEC project are associated with these additional parking and laydown areas.

The Project Owner completed Phase I Environmental Site Assessments (ESAs) in conformance with the scope and limitations of ASTM Practice E 1527-05, to determine whether use of these parcels would create conditions that could have potentially significant environmental impacts. In addition, information from the ESAs was used to identify the possible existence of health and safety related issues associated with the use of the parcels for construction parking and laydown.

The ESAs indicated that some previous hazardous materials use at the three sites resulted in stained soil and, in some cases, impacts to groundwater beneath the sites.

Hazardous materials used at the sites were those typically associated with automotive maintenance activities and wastes generated from automobile dismantling operations, consisting mainly of petroleum products such as oil and fuels. The presence of these materials in the soil due to past activities is not expected to pose a serious hazard from a construction worker exposure perspective. Use of the sites for the purpose of parking and material laydown will not result in extensive disturbance of the soil or groundwater at the site. Excavation will not occur on these parcels because they will only be used as laydown and parking areas. No permanent facilities will be constructed on these sites. After the owners vacate the properties, RCEC will install a geotech fabric or cloth on the surface of the existing soil and then a layer of crushed rock to make a firm surface for vehicular traffic. The sites will not be generally occupied; rather personnel contact with the site will be of a transient nature. Installation of the geotech fabric and the crushed rock surface will effectively cap the existing surface and minimize contact with any potentially hazardous material and prevent the further spread of such material. Upon completion of the temporary use, RCEC will remove the rock and fabric or leave in place if requested by the owner. Any existing contamination of groundwater will have no impact on the intended use of the sites.

WORKER SAFETY AND FIRE PROTECTION

Because all workers will undergo proper training, the proposed new worker parking and laydown areas would not result in impacts different than those previously analyzed. As a result, any potential worker safety and fire protection impacts associated with this Amendment would be less than significant.

RUSSELL CITY ENERGY CENTER (01-AFC-7C)
Relocation of Water Supply Pipeline and Sanitary Sewer Line

Amendment No. 1 had identified a potable water pipeline and sanitary sewer line route from Enterprise Avenue across City of Hayward property and onto the RCEC site from the south. After approval of Amendment No. 1 in 2007, the City of Hayward informed the project owner that similar-sized water and sewer lines are located under Depot Road that could potentially provide service to the RCEC. The project owner therefore, proposes to route the potable water pipeline and sanitary sewer line from the project to interconnect with the city lines at Depot Road. Final determination of the route would be determined during the detailed design phase.

According to the Project Owner, routing the water and sanitary sewer lines to interconnect with the City of Hayward lines at Depot Road will provide several advantages. First, the routing would be entirely on the RCEC property and would not need to cross the property of any adjacent landowners as would the earlier proposed route through the south side of the project. Second, the route from the City interconnection to the RCEC administration building would be shorter and, thus, a more economical installation. Third, the pipe could be installed parallel to the natural gas pipeline installation that will also come in from Depot Road, thereby reducing impacts to the overall site. The revised route can be constructed and serviced more efficiently and with less disruption.

LAWS, ORDINANCES, REGULATION, AND STANDARDS (LORS) - COMPLIANCE

Since the project was certified, there are no new or changed LORS that relate to the petition's request to reroute the water supply pipeline and sanitary sewer line.

SETTING

The requested relocation of the water supply pipeline and sanitary sewer line does not change the setting applicable to the RCEC project.

ANALYSIS OF RELOCATION OF WATER SUPPLY AND WASTEWATER LINES

BIOLOGICAL RESOURCES

The changes proposed in this Amendment, including the change in route for the water and sewer lines, will not cause any significant adverse impacts to biological resources. The construction and operation of the RCEC, as amended, will conform with all applicable LORS related to biological resources. This Amendment does not require changes to the Biological Resources Conditions of Certification.

CULTURAL RESOURCES

The relocation of the water supply and wastewater lines will not involve new ground disturbing activities, just a change in location of those activities described and approved in Amendment No. 1. The changes will not affect cultural resources differently than described in the Commission Decision. No significant impacts to cultural resources would result from the approval of this Amendment. Therefore, mitigation measures beyond those stipulated in the Commission Decision are not necessary, and the petition does not require changes to the Cultural Resources Conditions of Certification.

GEOLOGY AND PALEONTOLOGY

The new location of the water supply and sanitary wastewater lines would result in minor potential impacts to geological resources or paleontological resources, but would not cause geological hazards beyond those already analyzed during certification.

With the implementation of the mitigation measures already established for the RCEC project, such as paleontological resource monitoring and worker environmental awareness training, any potential impacts would be reduced to a level of insignificance. Therefore, no significant impacts to geological or paleontological resources result from this petition, and mitigation measures beyond those stipulated in the Commission Decision are not necessary. This petition does not require changes to the Geology and Paleontology Conditions of Certification.

HAZARDOUS MATERIALS MANAGEMENT

Re-routing the water supply and wastewater lines will not require changes to the hazardous materials used for the project.

LAND USE

The new route for the water supply and sanitary sewer pipelines will be shorter and entirely within the RCEC parcel as currently licensed. Therefore, this petition does not require changes to the land use analysis for this project.

NOISE AND VIBRATION

The re-routing of the water supply and sanitary sewer lines would not involve changes to the Commission Decision's findings and conclusions regarding noise. Although there would be some noise caused by excavation for the pipelines in the Depot Road area, this is a temporary impact. The impact would not differ greatly from that already considered for the RCEC project.

WASTE MANAGEMENT

No changes in the types or quantities of waste to be generated by construction or operation of the RCEC are associated with the proposed changes to the water and sanitary sewer line route. Waste management practices will not differ significantly from those described in the AFC and Amendment No. 1. Therefore, the petition does not require new mitigation measures of Waste Management Conditions of Certification.

WORKER SAFETY AND FIRE PROTECTION

The proposed change in route for the water supply and sanitary sewer pipelines would not result in impacts different than those previously analyzed for the RCEC project. As a result, any potential worker safety and fire protection impacts associated with this Amendment would be less than significant.

SUPPLEMENTAL STAFF ANALYSIS
AIR QUALITY

Testimony of Brenner Munger, PH.D., P.E.

INTRODUCTION

On November 18, 2009, Russell City Energy Center, LLC filed a petition with the California Energy Commission (Commission) to amend the Russell City Energy Center project (RCEC). The 600-megawatt (MW) natural gas-fired combined-cycle electric generating facility would be located in the City of Hayward in Alameda County. This project was certified on September 11, 2002, and amended on October 3, 2007, to relocate the facility approximately 1,300 feet northeast of the original location. The project has not yet begun construction.

This Supplemental Staff Analysis (SSA) presents a summary and evaluation of the applicant's 1-hour federal Nitrogen Dioxide (NO_2) standard air dispersion modeling analysis. The results of this analysis do not change staff's conclusions and recommendations as presented in the Staff Analysis of Proposed Project Modifications issued on June 28, 2010. This SSA also presents two additional staff Conditions of Certification (CoCs) proposed for the RCEC Project. The two additional CoCs are proposed as mitigation measures for the potential air quality impacts of the RCEC Project, specifically the Fire Pump Diesel Engine.

PROPOSED PROJECT

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Dispersion Modeling Assessment

Operational Impacts and Mitigation

Operational Modeling Analysis

The applicant provided, on July 6, 2010, a modeling analysis of operating period emissions[2] to show compliance with the new federal 1-hour NO_2 standard (AD 2010). This modeling analysis, using the AERMOD dispersion model (version 09292), includes the use of the Ozone Limiting Method (OLM) modeling option. The analysis for the federal 1-hour NO_2 analysis builds on the AERMOD OLM analysis done previously by the applicant for the project (AD 2008). The referenced reports from the applicant are included as Attachments A and B to this Supplemental Staff Analysis. The OLM option considers that the emissions of NOx from combustion sources are primarily in the form of nitric oxide (NO) and that once NO is emitted into the atmosphere it oxidizes to form NO_2, primarily through a reaction with ozone. The initial NO_2/NOx ratio was set at the

[2] The United States Environmental Protection Agency does not require modeling analyses to be performed for project construction emissions.

default value of 0.1 and the conversion of the rest of the NOx to NO_2 is assumed in the OLM modeling option to be limited by the hourly ambient ozone concentration. For this modeling analysis, the applicant obtained hourly monitored ozone concentrations from the San Leandro station for the same time period as the meteorological data (2003 to 2007). Missing ozone data for periods of 1 hour were interpolated from the San Leandro data before/after the missing period. Missing data for longer periods were replaced with data from the Hayward monitoring site or, if both San Leandro and Hayward data were missing, from the Fremont monitoring site. The applicant then ran the model for the 5 years 2003 through 2007 to estimate the hourly NO_2 concentrations for each receptor in the receptor grid. The applicant then calculated for each receptor the 5-year average of the annual 98th percentile (i.e., 8th highest) value of the daily maximum 1-hour modeled concentrations. The receptor with the highest 5-year average was used to represent the highest modeled project NO_2 impact.

The applicant determined final NO_2 impacts by adding the highest modeled project NO_2 impact described above to the three-year average of the annual 98th percentile maximum daily 1-hour NO_2 concentrations for 2007 through 2009 from the Fremont monitoring station which was the closest station with NO_2 monitoring data.

Supplemental Air Quality Table 12 presents the applicant's 1-hour NO_2 modeling results for the project for the 1-hour federal standard. This modeling analysis indicates that the project would not cause an exceedance of the federal 1-hour NO_2 standard.

Supplemental Air Quality Table 12
Project Operation Impacts

Pollutant	Avg. Period	Maximum Project Impact (µg/m^3)	Background (µg/m^3)	Total Impact (µg/m^3)	Standard (µg/m^3)	Percent of Standard
NO_2	1-hr Fed	94.189	88.4	182.6	188	97%

Source: AD 2010.

The applicant also provided an updated cumulative impact modeling assessment for comparison to the new federal 1-hour NO_2 standard. This cumulative multi-source modeling analysis estimated the impacts for RCEC project in addition to the impacts of the emission sources identified by the Bay Area Air Quality Management district as being located within six (6) miles of the RCEC project. **Supplemental Air Quality Table 13** presents the applicant's 1-hour NO_2 modeling results for the cumulative impact modeling assessment and shows that the additional sources within a six-mile radius of RCEC did not significantly change the results for the project impacts.

Supplemental Air Quality Table 13
Cumulative Impacts

Pollutant	Avg. Period	Maximum Cumulative Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Standard ($\mu g/m^3$)	Percent of Standard
NO_2	1-hr Fed	94.19	88.4	182.6	188	97%

Source: AD 2010.

Additional details for the air quality modeling analysis including source parameters, receptor grid and meteorology are given in the 2010 report (AD 2010) and the previous modeling report (AD 2008) for the RCEC project.

Staff has been able to obtain only limited guidance from the U.S. Environmental Protection Agency (U.S. EPA) or from any other regulatory body regarding how to evaluate a project's impact relative to the new federal 1-hour NO2 standard. The new standard is expressed in a statistical fashion using the eighth highest daily maximum 1-hour value, averaged over three years. The approach used by the applicant should be conservative since the emission inputs used in the modeling assessment assume that all emission sources are active 24 hours per day and 365 days in a year. The Fire Pump Diesel Engine creates the bulk of the estimated project NO_2 impacts. District Condition **AQ-46** would limit operation of the Fire Pump Diesel Engine to no more than 50 hours per year. Also, the Fire Pump Diesel Engine would <u>not</u> normally be operated for the routine weekly reliability testing or for emission testing during the nighttime hours which are the periods with the highest modeled NO_2 impacts.

For additional mitigation of the potential impacts, staff recommends two additional staff conditions for the Fire Pump Diesel Engine. These additional staff conditions would limit the run time for the weekly reliability testing of the Fire Pump Diesel Engine to no more than 30 minutes per hour (rather than the 60 minutes used in the modeling analysis) and would prohibit simultaneous start-up of either of the combustion turbines (Units S-1 and S-3) and operation of the S-6 Fire Pump Diesel Engine for reliability-related activities or emissions testing. Although the applicant has not conducted computer modeling for these recommended conditions, since the Fire Pump Diesel Engine creates the bulk of the estimated project NO_2 impacts, reducing the duration of the weekly testing will reduce project impacts and provide additional assurance that the project would not cause a violation of the federal short-term NO_2 standard.

Staff reviewed the applicant's modeling analysis and found the procedures and inputs to be acceptable specifically for the RCEC project for the assessment of potential CEQA impacts.

PROPOSED CONDITIONS OF CERTIFICATION

The staff recommends two additional Air Quality Staff Conditions of Certification as CEQA mitigation measures for the potential air quality impacts associated with the diesel engine fire pump. The other proposed staff conditions and district conditions remain as provided in the Final Commission Decision issued in October 2007 and the Staff Analysis of Proposed Project Modifications issued on June 28, 2010.

STAFF CONDITIONS OF CERTIFICATION

AQ-SC15 The owner/operator shall not operate S-6 Fire Pump Diesel Engine for testing to demonstrate compliance with a District, State or Federal emission limit, or for reliability-related activities (maintenance and other testing, but excluding emission testing) simultaneously with the operation of either gas turbine (S-1 or S-3) in start-up mode.

Verification: As part of the quarterly and annual compliance reports as required by AQ-19, the project owner shall include information on the date, time, and duration of any violation of this permit condition.

AQ-SC16 The owner/operator shall limit the operation of S-6 Fire Pump Diesel Engine to no more than 30 minutes per hour for reliability-related activities (maintenance and other testing, but excluding emission testing or emergency operation).

Verification: As part of the quarterly and annual compliance reports as required by AQ-19, the project owner shall include information on the date, time, and duration of any violation of this permit condition.

CONCLUSIONS

Staff reviewed the applicant's 1-hour federal Nitrogen Dioxide (NO_2) standard air dispersion modeling analysis and found the procedures and inputs to be acceptable specifically for the RCEC project relative to the assessment of potential CEQA impacts.

With the adoption of the two additional staff conditions recommended in this Supplemental Staff Analysis, the potential CEQA impacts of the RCEC project relative to the federal 1-hour NO_2 standard would be less than significant.

REFERENCES

AD 2008 – Atmospheric Dynamics, Inc. AERMOD Modeling Assessment for the Russell City Energy Center Amendment. September 2008.

AD 2010 - Atmospheric Dynamics, Inc.1-Hour NO_2 Modeling Assessment for the Russell City Energy Center Amendment. July 2010. Received 07/06/10.

ATTACHMENT A

1-HOUR NO_2 MODELING ASSESSMENT

For the:

Russell City Energy Center Amendment

Prepared for:

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July 2010

Russell City Energy Center –1-Hour NO_2 Air Quality Impact Assessment

This report describes the Russell City Energy Center (RCEC) air quality modeling results for the comparison to the new Federal 1-hour standard of 188 ug/m^3. Potential air quality impacts were evaluated based on air quality dispersion modeling, as described herein. With the exception of the binary data files, all input and output modeling files are contained on a CD-ROM disk provided with this report. The modeling analyses were performed using the techniques and methods approved by the Bay Area Air Quality Management District (BAAQMD) modeling staff and outlined in the September 2008 *AERMOD Modeling Assessment*.

DISPERSION MODELING

For modeling the potential impact of RCEC in terrain that is both below and above stack top (defined as simple terrain when the terrain is below stack top and complex terrain when it is above stack top), the USEPA guideline model AERMOD (version 09292) was used with hourly ozone limiting. The meteorological and receptor data sets were those used in the previous air quality modeling analysis, as outlined in the *AERMOD Modeling Assessment* (September 2008). The purpose of the revised AERMOD modeling analysis was to evaluate compliance with the new federal 1-hour NO_2 air quality standard.

Ozone Limiting Method

The Ozone Limiting Method (OLM) was used with concurrent hourly 1-hour ozone concentrations to calculate the 1-hour NO_2 concentrations using the AERMOD OLM subroutine. The OLM involves an initial comparison of the estimated maximum NO_x concentration and the ambient ozone concentration to determine which is the limiting factor to NO_2 formation. If the ozone concentration is greater than the maximum NO_x concentration, total conversion is assumed. If the NO_x concentration is greater than the ozone concentration, the formation of NO_2 is limited by the ambient ozone concentration. In this case, the NO_2 concentration is set equal to the ozone concentration plus a correction factor that accounts for in-stack and near-stack thermal conversion. Ozone data from the San Leandro monitoring site for the same period as the meteorological data (2003-2007) were used for the OLM analyses. Missing ozone data for periods of 1 hour were interpolated from the San Leandro data before/after the missing period. Missing data for longer periods were replaced with data from Hayward monitoring site or, if both San Leandro and Hayward data were missing, from the Fremont monitoring site.

Background Air Quality

Each federal or state AAQS is comprised of two basic elements: (1) a numerical limit expressed as an allowable concentration, and (2) an averaging time which specifies the period over which the concentration value is to be measured. Table 1 presents the current federal and state AAQS for NO_2.

TABLE 1 State and Federal Ambient Air Quality Standards			
Pollutant	**Averaging Time**	**California Standards Concentration**	**National Standards Concentration**
Nitrogen dioxide	Annual Average	0.03 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)
	1-hr	0.18 ppm (339 µg/m^3)	0.1 ppm (188 µg/m^3)

The nearest NO_2 air quality monitoring site to the proposed project site is the Fremont-Chapel Way station. BAAQMD has previously approved use of data from this monitoring station as appropriate for NAAQS compliance demonstration for RCEC. Ambient monitoring data for this site for the most recent three (3) year period, as provided by the BAAQMD (attached), is summarized in Table 2.

Table 2 Monitoring Data Summary (98th Percentile Monitored Values)					
Pollutant	**Site**	**Avg. Time**	**2007**	**2008**	**2009**
NO2, ppb	Fremont	1 Hr	48	48	.45

Compliance with the federal 1-hour NO_2 standard is determined by the 3-year average of the 98th percentile of the yearly distribution of 1-hour daily maximum concentrations. Accordingly, the data from the Fremont monitoring station were evaluated to identify the 3-year average 1-hour NO_2 98th percentile background concentration of 47 ppb, which converted into micrograms per cubic meter (ug/m^3) produces a background concentration of 88.36 ug/m^3.

AERMOD Modeling Results

This section describes the results in magnitude and spatial extent of ground level concentrations, resulting from NO_x emissions from the RCEC project. The 98th percentile maximum 1-hour modeled concentrations were added to the 98th percentile background concentrations to calculate a total impact.

Table 3 summarizes 98th percentile 1-hour modeled NO_2 concentration which demonstrates compliance with the new 1-hour federal NO_2 standard. The maximum modeled concentration occurred during turbine startup with the simultaneous testing of the fire pump. Operation in this scenario is very unlikely to occur due to manpower constraints that would prevent facility personnel from starting up a gas turbine and testing the fire pump engine at the same time. This scenarios therefore represents a highly conservative estimate of worst-case emissions from RCEC

TABLE 3
Maximum Modeled Criteria Pollutant Concentrations

Pollutant	Avg. Period	98th Percentile Concentration (µg/m³)	Model Run-Start or Norm	Background (µg/m³)	Total (µg/m³)	Class II Significance Level (µg/m³)	BAAQMD SILs (µg/m³)	Ambient Air Quality CAAQS/NAAQS (µg/m³)	(µg/m³)
NO_2	1-hour	94.189[a]	Start	88.36	182.55	7.5	19	339	188

[a] The project maximum 1-hour impact is due primarily to the testing of the emergency fire pump. All 1-hour NO_2 concentrations were calculated with ozone limiting

Cumulative 1-Hour NO_2 Analysis

A cumulative multi-source modeling analysis was previously provided to the California Energy Commission for the proposed RCEC emission sources. The BAAQMD had previously provided an emissions inventory of sources located within six (6) miles of RCEC. These additional sources, whose stack information and emissions rates are respectively listed below in Tables 4 and 5, are the same ones that were previously included within the cumulative impact modeling assessments provided to the CEC for both the RCEC and Eastshore projects. These sources were included in an updated cumulative impact modeling assessment for comparison to the new federal 1-hour NO_2 standard. As expected, these additional sources within a six-mile radius of RCEC did not significantly change the results provided above.

TABLE 4 Modeled Stack Parameters for Proposed Sources provided by BAAQMD*

Facility#-Source	Stack Height (meter)	Stack Diam. (meter)	Stack Temp (deg K)	Exhaust Velocity (m/s)	Stack Coordinates (meters)–NAD27		
					X	Y	Z**
#00698-Georgia Pacific Gypsum Emer.Gen	2.134	0.500	750.37	46.94	572807	4173361	7.8
#16440-Hayward Public Works Emer.Gen***	5.486	0.500	763.71	46.94	579654	4163912	3.1
#16451- Hayward Public Works Emer.Gen	2.591	0.250	740.37	56.29	575910	4168060	2.4
#17037-Elder Care Alliance Emer.Gen	2.286	0.333	844.26	49.63	585526	4160731	12.2
#17548-Alameda County Nat.Gas Boiler****	6.096	1.674	422.04	4.96	577886	4174623	129.9
#17553-Rohm & Haas Pyrolysis Furnace	7.925	1.167	1033.15	6.42	577238	4165215	3.4
#17553-Rohm & Haas Reg.Thermal Oxidizer	9.144	2.498	377.59	4.15	577238	4165215	3.4
#17621-Skywest Emer.Gen	11.582	1.333	733.15	47.03	578142	4168365	11.6
#18189-Astra Zeneca Emer.Gen	2.134	0.500	710.37	27.19	577689	4166266	7.8

*Those facilities with emissions of pollutants other than VOC only.
**Source elevations taken from nearest point in USGS DEM data files with 10-meter spacing.
***Exit velocity conservatively revised to match previous similar source; value shown on BAAQMD inventory was unrealistically high.
****Facility emissions given for three sources (two identical boilers and one emer.gen). All emissions

TABLE 4 Modeled Stack Parameters for Proposed Sources provided by BAAQMD*

Facility#-Source	Stack Height (meter)	Stack Diam. (meter)	Stack Temp (deg K)	Exhaust Velocity (m/s)	Stack Coordinates (meters)–NAD27		
					X	Y	Z**

modeled from one of the two boilers. Stack flowrate and temperature revised to reflect available information for similar sized boilers; values shown by BAAQMD inventory were unrealistic.

TABLE 5 Modeled Emissions for Proposed Sources as provided by BAAQMD

Facility#-Source	Emission Rates (g/s)			
	NOx	SO_2	CO	$PM_{10}/PM_{2.5}$
#00698-Georgia Pacific Gypsum Emer.Gen	0.001927	0.000086	0.000777	0.000058
#16440-Hayward Public Works Emer.Gen	0.001093	0.000058	0.000173	0.000029
#16451- Hayward Public Works Emer.Gen	0.000748	0.000029	0.000058	0.000029
#17037-Elder Care Alliance Emer.Gen	0.001093	0.000058	0.000173	0.000029
#17548-Alameda County Nat.Gas Boiler	0.080001	0.001985	0.158421	0.010701
#17553-Rohm & Haas Pyrolysis Furnace	0.004603	0.000288	0.008371	0.002273
#17553-Rohm & Haas Reg.Thermal Oxidizer	0.041137	0.000086	0.003279	N/A
#17621-Skywest Emer.Gen	0.019878	0.000633	0.002359	0.000403
#18189-Astra Zeneca Emer.Gen	0.000863	N/A	0.000432	0.000029

Table 6 table below summarizes the results of the cumulative modeling analysis which also demonstrates compliance with the new federal 1-hour NO_2 standard.

TABLE 6 Cumulative Impacts Modeling Results (µg/m3)

Pollutant	Averaging Time	98th Percentile Multisource Concentration (µg/m^3)	Background (µg/m^3)	Total Ambient Concentration (µg/m^3)	State Standard (µg/m^3)	Federal Standard (µg/m^3)
NO_2	1-hour	94.19	88.36	182.55	339	188

Conclusion

The results of the revised AERMOD analysis of the RCEC project demonstrates that the proposed project will comply with new federal 1-hour ambient air quality standard for NO_2.

ATTACHMENT B

AERMOD MODELING ASSESSMENT

For the:

Russell City Energy Center Amendment

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September 2008

Russell City Energy Center – AERMOD Air Quality Impact Assessment

This report describes the revised Russell City Energy Center (RCEC) air quality modeling results, in both magnitude and spatial extent, of ground level concentrations resulting from the use of the AERMOD dispersion model.

Potential air quality impacts were evaluated based on air quality dispersion modeling, as described in herein. All input and output modeling files are contained on a CD-ROM disk provided with this report. The modeling analyses were performed using the techniques and methods discussed with the Bay Area Air Quality Management District (BAAQMD) modeling staff.

DISPERSION MODELING

For modeling the potential impact of RCEC in terrain that is both below and above stack top (defined as simple terrain when the terrain is below stack top and complex terrain when it is above stack top) the USEPA guideline model AERMOD (version 07026) was used as well as the latest versions of the AERMOD preprocessors to determine surface characteristics (AERSURFACE version 08009), to process meteorological data (AERMET version 06341), and to determine receptor slope factors (AERMAP version 06341). The purpose of the AERMOD modeling analysis was to evaluate compliance with the California and federal air quality standards.

Meteorological Preprocessing with AERMET

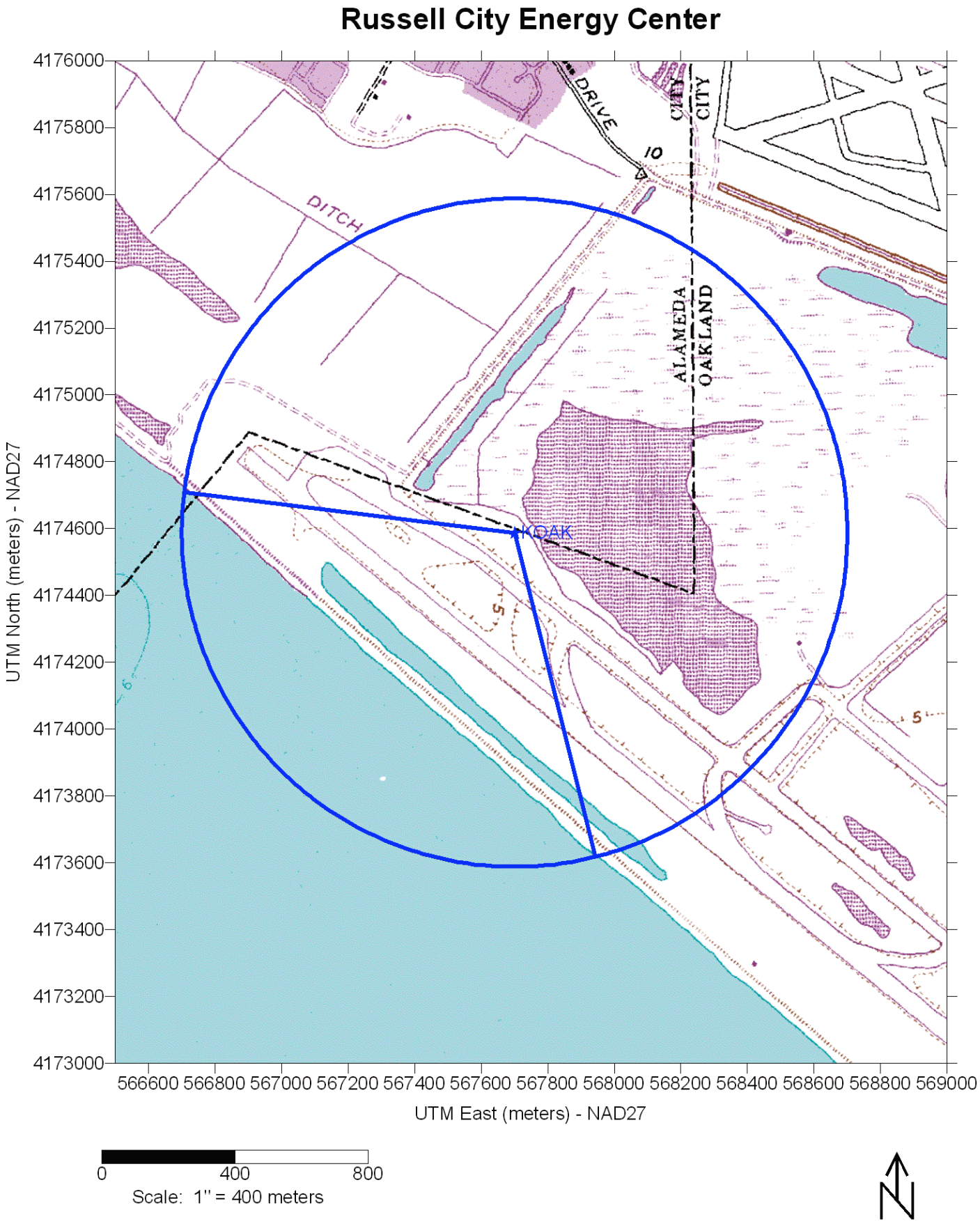
The nearest representative National Weather Bureau Army Navy sites (WBAN) in the general area of the proposed Project is the Oakland International Airport. This WBAN site has used an Automated Surface Observing System (ASOS) since January 2000 to measure surface meteorological data that can be readily converted to a site dispersion database that is directly used by atmospheric dispersion models. The ASOS data were downloaded from the National Climatic Data Center (NCDC) website in CD-3505 format, and then converted to SAMSON format using the Russ Lee freeware program NCDC_CNV. This program also substitutes interpolated wind speed and direction data for single hours of missing data in accordance with USEPA recommended procedures (Lee, R. & Atkinson, D., 1992). Periods with more than one consecutive missing hour of wind speed or wind direction were left as missing data to ensure that worst case predicted impacts resulted from actual rather than interpolated meteorological conditions. The most recent five (5) years of meteorological data (2003-2007) collected from this ASOS site, which is located 12.8 kilometers northwest of RCEC, was used in the analysis. Based on comparison of surface characteristics for the RCEC project site and ASOS monitoring location as discussed with BAAQMD, this ASOS data is considered representative of the RCEC project location.

Surface characteristics are determined with AERSURFACE in accordance with USEPA guidance documents ("*AERMOD Implementation Guide,*" 1/09/08; and "*AERSURFACE User's Guide*," EPA-454/B-08-001, 1/08) as described below. ***Bowen ratio*** is based on a simple unweighted geometric mean while ***albedo*** is based on a simple unweighted arithmetic mean for the 10x10 km area centered on the selected location (i.e., no direction

or distance dependence for either parameter). ***Surface roughness length*** is based on an inverse distance-weighted geometric mean for upwind distances up to one (1) km from the selected location. To determine representativeness, AERSURFACE was executed based on BAAQMD regional guidance for the East Bay, specifically to include use of non-arid conditions, an airport location, no snow cover during the winter, and re-assignment of seasonal results to each month (as shown below). For the final meteorological data processing for modeling purposes, AERSURFACE was run for dry, average, and wet moisture conditions and the resulting seasonal results were applied in Stage 3 of the AERMET to each month in the meteorological data based on the total monthly precipitation for that month compared to a 30-year climatological distribution in accordance with current USEPA practice/guidance. The roughness length was calculated for the Oakland ASOS location as two distinct sectors: over water (167°-278°) and over land (278°-167°) as depicted in Figure 1. Additionally, albedo and Bowen ratio was calculated for the ASOS location based on a 10x10 km area as depicted in Figure 2. The coordinates provided by the BAAQMD for the Oakland ASOS location were 567604, 4174784 meters/NAD83 and the project location based on the average of the modeled turbine stack locations is 576437, 4165560 meters/NAD83. Based upon the similar surface characteristics between the ASOS and the RCEC site locations, as well as the identical wind and sky cover patterns, the use of Oakland ASOS data is considered representative in the determination of project impacts.

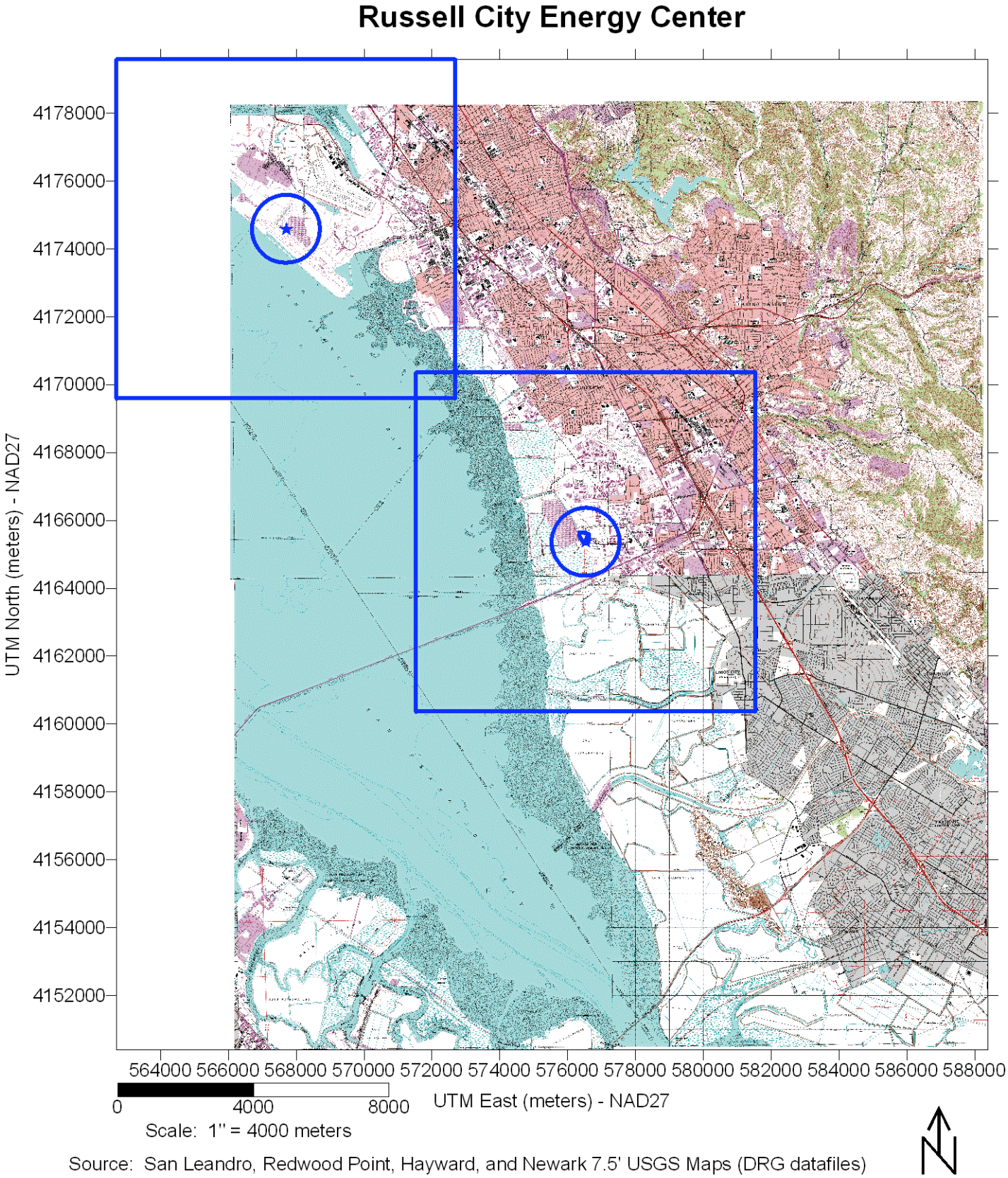
The surface meteorological data for Oakland were pre-processed for direct use by the AERMET (version 06341) preprocessor model as described above. Upper air data for the same time period was taken from the closest representative NWS radiosonde station that, when combined with the proposed surface dataset, met the USEPA required data recovery rates of 90%. This radiosonde station is also Oakland International Airport. The most recent five-year period of combined surface and upper air data with better than 90% data recovery rates for each calendar year was 2003-2007. As part of the AERMET input requirements, albedo, Bowen ratio, and surface roughness length must be determined. These values were determined with AERSURFACE using the BAAQMD default inputs described above based on latest USEPA guidance (i.e., *AERMOD Implementation Guide*, revised January 9, 2008, and the *AERSURFACE User's Guide* (EPA-454/B-08-001). The AERSURFACE inputs and results are shown in Table 1.

Figure 1 Oakland ASOS Monitoring Location and Surface Roughness Sectors



Source: San Leandro, Redwood Point, Hayward, and Newark 7.5' USGS Maps (DRG datafiles)

Figure 2 Oakland ASOS Monitoring and Project Locations



Source: San Leandro, Redwood Point, Hayward, and Newark 7.5' USGS Maps (DRG datafiles)

Table 1 Monthly Parameters for AERMET

Month	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
Surface Roughness (meters), Albedo, and Bowen Ration based on the following Seasonal Assumptions:												
Season	Winter	Spring	Spring	Summer	Summer	Summer	Summer	Fall	Fall	Fall	Winter	Winter
Arid	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Airport	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Surface Roughness (meters) and Albedo 167 – 278 degrees												
Roughness	0.011	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.011	0.011
Albedo	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Surface Roughness (meters) and Albedo 278 – 167 degrees												
Roughness	0.056	0.067	0.067	0.075	0.075	0.075	0.075	0.071	0.071	0.071	0.056	0.056
Albedo	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Bowen Ratio for each Month/Year based on above inputs and following surface moisture contents:[1]												
2003	Dry	Dry	Dry	Wet	Wet	Avg	Avg	Avg	Dry	Dry	Avg	Wet
2004	Avg	Wet	Avg	Avg	Dry	Avg	Avg	Avg	Wet	Wet	Avg	Wet
2005	Avg	Avg	Avg	Avg	Wet	Wet	Avg	Avg	Dry	Dry	Avg	Wet
2006	Avg	Avg	Wet	Wet	Wet	Avg	Avg	Avg	Dry	Avg	Avg	Avg
2007	Dry	Avg	Dry	Avg	Avg	Avg	Avg	Avg	Avg	Wet	Dry	Avg
Bowen Ratio												
2003	0.38	0.35	0.35	0.37	0.37	0.26	0.26	0.28	0.38	0.38	0.28	0.23
2004	0.28	0.22	0.25	0.26	0.22	0.26	0.26	0.28	0.23	0.23	0.28	0.23
2005	0.28	0.25	0.25	0.26	0.37	0.37	0.26	0.28	0.38	0.38	0.28	0.23
2006	0.28	0.25	0.22	0.37	0.37	0.26	0.26	0.28	0.38	0.28	0.28	0.28
2007	0.38	0.25	0.35	0.26	0.26	0.26	0.26	0.28	0.28	0.23	0.38	0.38

[1]Dry/Average/Wet designate monthly rainfall totals for the month/year from Oakland Museum climatological data that fall into the lower 30th percentiles / middle 40th percentiles / upper 30th percentiles for the 30-year period 1971-2000

Good Engineering Practice Stack Height Analysis

BPIP-PRIME was used to generate the wind-direction-specific building dimensions for input into AERMOD. All necessary on-site structures were included for analysis with BPIP-PRIME.

Receptor Grid Selection and Coverage

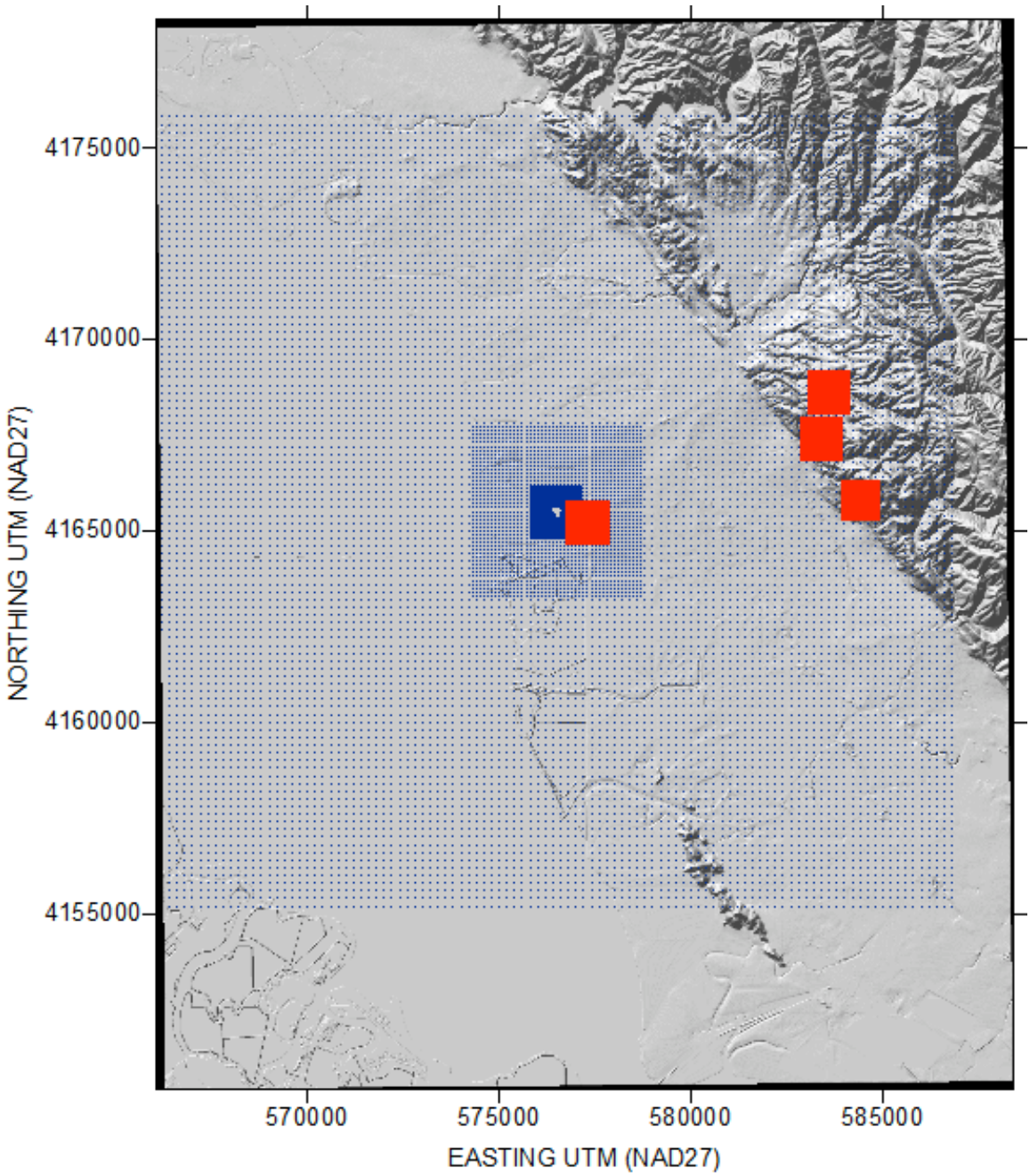
Receptor and source base elevations were determined from the U.S. Geological Survey (USGS) Digital Elevation Model (DEM) data using the 7½ minute format data (10-meter spacing between grid nodes). All coordinates were referenced to UTM North American Datum 1927 (NAD27), Zone 10. Except for fenceline receptors, the receptor locations were placed exactly on the DEM nodes from 10-meter DEM files (i.e., elevations taken directly from DEM files). Every effort was made to maintain receptor spacing across DEM file boundaries.

Cartesian coordinate receptor grids are used to provide adequate spatial coverage surrounding the Project area for assessing ground-level pollution concentrations, to identify the extent of significant impacts, and to identify maximum impact locations. The receptor grids used in this analysis are as follows:

- 10-meter resolution from the Project fenceline and extending outwards in all directions 500 meters. This is called the downwash grid. In addition, receptors were placed at 10-meter intervals or less along the property fenceline.
- 50-meter resolution that extends outwards from the edge of the downwash grid to two kilometers in all directions. This is referred to as the intermediate grid.
- 200-meter resolution that extends outwards from the edge of the intermediate grid to 10 kilometers in all directions. This is referred to as the coarse grid.
- 10-meter resolution around any location on the coarse and intermediate grids where a maximum impact is modeled that is above the concentrations on the downwash grid. In the modeling analyses, several of the maximum impacts were located in the 50 or 200-meter intermediate and coarse grids. Thus, four (4) refined grids were prepared.

DEM receptor data was input into AERMAP (version 06341) to calculate hill height scales as per EPA guidance. For the AERMAP analysis, 30-meter DEM data were used. Concentrations within the facility fenceline will not be calculated. Elevations for fenceline receptor locations were determine from available DEM data. The receptors used in the modeling analysis are presented in Figure 3.

Figure 3 AERMAP Receptors



The high resolution receptor grids (in red) were developed for the following:

1-hour start for NOx and CO
8-hour start for CO
NOx commissioning 1-hour
CO commissioning 1 and 8-hour
SO2 for 1, 3, 24, and annual
NOx annual

Ambient Ratio Method/Ozone Limiting Method

Annual NO_2 concentrations were calculated using the Ambient Ratio Method (ARM), adopted in Supplement C to the Guideline on Air Quality Models (EPA, 1994). The Guideline allows a nationwide default conversion rate of 75 percent for annual NO_2/NO_x ratios.

The Ozone Limiting Method (OLM) was used with concurrent hourly 1-hour ozone concentrations to calculate the 1-hour NO_2 concentrations using the AERMOD OLM subroutine.. The OLM involves an initial comparison of the estimated maximum NO_x concentration and the ambient ozone concentration to determine which is the limiting factor to NO_2 formation. If the ozone concentration is greater than the maximum NO_x concentration, total conversion is assumed. If the NO_x concentration is greater than the ozone concentration, the formation of NO_2 is limited by the ambient ozone concentration. In this case, the NO_2 concentration is set equal to the ozone concentration plus a correction factor that accounts for in-stack and near-stack thermal conversion. Ozone data from the San Leandro monitoring site for the same period as the meteorological data (2003-2007) were used for the OLM analyses. Missing ozone data for periods of 1 hour were interpolated from the San Leandro data before/after the missing period. Missing data for longer periods were replaced with data from Hayward monitoring site or, if both San Leandro and Hayward data were missing, from the Fremont monitoring site.

Background Air Quality

Each federal or state AAQS is comprised of two basic elements: (1) a numerical limit expressed as an allowable concentration, and (2) an averaging time which specifies the period over which the concentration value is to be measured. Table 2 presents the current federal and state AAQS.

TABLE 2
State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Ozone	1-hr	0.09 ppm (180 μg/m^3)	-
	8-hr	0.07 ppm (137 μg/m^3)	0.08 ppm (157 μg/m^3) (3-year average of annual 4th-highest daily maximum)
Carbon Monoxide	8-hr	9.0 ppm (10,000 μg/m^3)	9 ppm (10,000 μg/m^3)
	1-hr	20 ppm (23,000 μg/m^3)	35 ppm (40,000 μg/m^3)
Nitrogen dioxide	Annual Average	0.03 ppm (57 μg/m^3)	0.053 ppm (100 μg/m^3)
	1-hr	0.18 ppm (339 μg/m^3)	-
Sulfur dioxide	Annual Average	-	0.03 ppm (80 μg/m^3)

TABLE 2
State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
	24-hr	0.04 ppm (105 μg/m^3)	0.14 ppm (365 μg/m^3)
	3-hr	-	0.5 ppm (1,300 μg/m^3)
	1-hr	0.25 ppm (655 μg/m^3)	-
Respirable particulate matter (10 micron)	24-hr	50 μg/m^3	150 μg/m^3
	Annual Arithmetic Mean	20 μg/m^3	-
Fine particulate matter (2.5 micron)	Annual Arithmetic Mean	12 μg/m^3	15 μg/m^3 (3-yr average)
	24-hr	-	35 μg/m^3 (3-yr average of 98th percentiles)
Sulfates	24-hr	25 μg/m^3	-
Lead	30-day	1.5 μg/m^3	-
	Calendar Quarter	-	1.5 μg/m^3

μg/m^3 -- micrograms per cubic meter
ppm—parts per million

Source: CARB website, table updated 9/22/08

The nearest criteria pollutant air quality monitoring sites to the proposed project site would be the stations located in the east bay area as follows: Fremont-Chapel Way, Hayward-La Mesa, San Leandro-County Hospital, and Richmond. Ambient monitoring data for these sites for the most recent three (3) year period is summarized in Table 3.

Table 3 Monitoring Data Summary (Highest Monitored Values)					
Pollutant	**Site**	**Avg. Time**	**2005**	**2006**	**2007**
Ozone, ppm	Fremont	1 Hr	.105	.102	.079
	Hayward		.093	.101	.075
	San Leandro		.099	.088	.071
	Fremont	8 Hr 4th High	.051	.069	.055
	Hayward		.052	.067	.055
	San Leandro		.046	.060	.052
PM10, ug/m3	Fremont	24 Hr	51.7	54	57.5
	Fremont	Annual	17.2	19.6	19.0
PM2.5, ug/m	Fremont	24 Hr	33.4	43.9	51.2
	Fremont	Annual	9	-	8.7
CO, ppm	Fremont	8 Hr	1.96	1.81	1.57
		1 Hr	3.2	2.9	2.5
NO2, ppm	Fremont	1 Hr	.069	.063	.058
	Fremont	Annual	.015	.015	.014
SO2, ppm	Oakland	Annual	.003	-	-
	Richmond		.001	.002	.001
	Oakland	1 Hr	-	-	-
	Richmond		.02	.026	.037
	Oakland	3 Hr	-	-	-
	Richmond		.011	.014	.025
	Oakland	24 Hr	.009	-	-
	Richmond		.006	.006	.008

Table 4 shows the background air quality values based upon the data presented in Table 3 but converted into ug/m^3. The background values represent the highest values reported for any site during any single year of the most recent 3-year period.

Table 4 Background Air Quality Values	
Pollutant and Averaging Time	**Background Value, ug/m3**
Ozone – 1 Hour	210
Ozone – 8 Hour	135
PM10 – 24 Hour	57.5
PM10 – Annual	19.6
PM2.5 – 24 Hour	51.2
PM2.5 – Annual	9
CO – 8 Hour	2177.8
CO – 1 Hour	3680.0
NO2 – 1 Hour	129.6
NO2 – Annual	28.2
SO2 – 1 Hour	96.9
SO2 – 3 Hour	65.0
SO2 – 24 Hour	23.6
SO2 - Annual	7.9

Table 5 present data on the significant impact and/or threshold levels applied to the proposed facility.

TABLE 5
BAAQMD (PSD) Significant Impact Threshold Values[1]

Pollutant	Averaging Time	SIL, µg/m^3
NO_2	1 Hour	19[2]
	Annual	1
SO_2	3 Hour	25
	24 Hour	5
	Annual	1
CO	1 Hour	2000
	8 Hour	500
PM10/PM2.5	24 Hour	5
	Annual	1

[1] EPA PSD SIL (significant impact level) values.
[2] BAAQMD value only.

AERMOD Modeling Results

This section describes the results, in both magnitude and spatial extent of ground level concentrations, resulting from emissions from the RCEC project. The maximum-modeled concentrations were added to the maximum background concentrations to calculate a total impact.

Potential air quality impacts were evaluated based on air quality dispersion modeling, as described above. All input and output modeling files are contained on the enclosed CD-ROM disk. All modeling analyses were performed using the techniques and methods as discussed with BAAQMD staff.

Table 6 summarizes maximum modeled concentrations for each criteria pollutant and associated averaging periods. Where referenced, some of the listed modeled concentrations occurred during turbine startup. In order to assess the significance of the modeled concentrations, the maximum concentrations were modeled and compared to the Class II PSD SILs.

TABLE 6
Maximum Modeled Criteria Pollutant Concentrations

Pollutant	Avg. Period	Maximum[a] Concentration (μg/m^3)	Model Run-Start or Norm	Background (μg/m^3)	Total (μg/m^3)	Class II Significance Level (μg/m^3)	BAAQMD SILs (μg/m^3)	Ambient Air Quality CAAQS/NAAQS (μg/m^3)	(μg/m^3)
NO_2	1-hour	119.96[d]	Start	129.6	249.56	-	19	339	-
	Annual	0.22	Norm	28.2	28.42	1	1	57	100
PM10[1]	24-hour	6.61[b]	Norm	57.5	64.11	5	5	50	150
	Annual	0.69	Norm	19.6	20.29	1	1	20	-
PM2.5[1]	24-hour	2.24[c]	Norm	51.2	53.44	5	5	-	35
	Annual	0.69	Norm	9.0	9.69	1	1	12	15
CO	1-hour	1574.03	Start	3680.0	5,254.0	2000	2000	23,000	40,000
	8-hour	321.37	Start	2177.8	2,499.2	500	500	10,000	10,000
SO_2	1-hour	14.29	Norm	96.9	111.19	-	-	655	-
	3-hour	6.24	Norm	65.0	71.24	25	25	-	1,300
	24-hour	0.66	Norm	23.6	24.26	5	5	105	365
	Annual	0.02	Norm	7.9	7.92	1	1	-	80

[1] The project is located in a state non-attainment area for PM2.5 and PM10. The modeled project impacts by themselves, without considering background, are less than the California State PM2.5 and PM10 ambient air quality standards and thus, do not cause or contribute to the regional non-attainment status.

b High 6th high is 4.22 ug/m^3.

[c] High 8th high for PM2.5 24-hour

[d] All 1-hour NO_2 concentrations were calculated with ozone limiting

Table 7 summarizes the results of the modeling analysis during the commissioning process. Note that the 1-hour NO_2 impacts were calculated with ozone limiting.

TABLE 7
Air Quality Impact Summary for Turbine Commissioning Activities

Pollutant	Avg. Period	Maximum Concentration (µg/m^3)	Background (µg/m^3)	Total (µg/m^3)	Class II Significance Level (µg/m^3)	BAAQMD SILs (µg/m^3)	Ambient Air Quality CAAQS/NAAQS	
							(µg/m^3)	(µg/m^3)
NO_2	1-hour	141.39	129.6	270.99	-	19	339	-
CO	1-hour	5,750.18	3,680.0	9,430.18	2,000	2,000	23,000	40,000
	8-hour	627.69	2,177.8	2,805.49	500	500	10,000	10,000

Shoreline Fumigation Modeling Results

Fumigation analyses with the EPA Model SCREEN3 (version 96043) were conducted for both inversion breakup fumigation conditions and shoreline fumigation conditions.

Inversion breakup fumigation impacts of 1.237 µg/m^3 for a unitized emission rate (1 g/s) were predicted to occur 16,141 meters from the turbine stacks. At this distance, the maximum fire pump impact predicted by SCREEN3 under all meteorological conditions was 12.48 µg/m^3 for a 1 g/s emission rate. No inversion breakup fumigation impacts were predicted to occur by SCREEN3 for emissions from the much lower fire pump stack. These unitized impacts were used to calculate 1-hour inversion breakup impacts for all pollutants by multiplying the unitized impacts by the pollutant emission rates (in g/s). The fumigation impacts predicted for the turbine emissions are added to the maximum fire pump impacts predicted to occur at the same location under all SCREEN3 meteorological conditions to obtain total pollutant impacts for the facility. The pollutant impacts are shown in Table 8.

Table 8
Inversion Breakup Fumigation Impact Summary

Pollutant /Avg. Time	Turbine Impacts (µg/m^3)	Fire Pump Impacts (µg/m^3)	Total Impacts (µg/m^3)
NOx / 1-hour	5.04	4.44	9.48
SO_2 / 1-hour	1.93	<0.005	1.93
CO / 1-hour	6.14	0.34	6.48

Shoreline fumigation impacts were evaluated for TIBL factors (A) from 6.0 (the SCREEN3 default factor) to 2.0 (by revising and recompiling SCREEN3 for TIBL factors of 2.0, 3.0, 4.0, and 5.0). The final effective plume centerline height for the turbine stacks is 164 meters for rural conditions of F stability and 2.5 meter/second (m/s) wind speeds at the turbine stack release height. TIBL heights at the nearest turbine stack to the shoreline of the San Francisco Bay (a distance of 1,670 meters) range from 82 to 163 meters for TIBL factors from 2.0 to 4.0, respectively (i.e., TIBL heights at the stack location are less than the final effective plume centerline height). For TIBL factors of 5.0 and 6.0, the TIBL heights at the turbine stack location are greater than the final effective plume centerline height, so no shoreline fumigation impacts would occur for these TIBL factors. Similarly, no shoreline fumigation impacts would occur for the much lower fire pump stack since TIBL heights at the facility are greater than the final effective plume

centerline height for the fire pump for rural conditions of F stability and 2.5 m/s wind speeds at the fire pump stack release height.

The maximum unitized TIBL impact of 6.810 µg/m³ (for turbine emissions of 1 g/second) was predicted to occur with a TIBL factor of 4.0 at a distance of 2,101 meters from the turbine stacks. At this distance, the maximum fire pump impact predicted by SCREEN3 under all meteorological conditions was 97.25 µg/m³ for a 1 g/s emission rate. Like the inversion breakup fumigation conditions discussed above, these unitized impacts were used to calculate 1-hour shoreline fumigation impacts for the entire facility by multiplying the unitized impacts by the pollutant emission rates (in g/s) and adding the turbine and fire pump impacts together. These pollutant impacts are shown in the following table.

Table 9
Shoreline Fumigation Impact Summary

Pollutant/Avg. Time	Turbine Impacts (µg/m^3)	Fire Pump Impacts (µg/m^3)	Total Impacts (µg/m^3)
NO_x / 1-hour	27.76	34.60	62.36
SO_2 / 1-hour	10.64	0.04	10.68
CO / 1-hour	33.80	2.67	36.47

SCREEN3 predicted a maximum offsite turbine unitized impact under all meteorological conditions of 4.111 µg/m³ (for turbine emissions of 1 g/s) at a distance of 179 meters. The maximum unitized fire pump SCREEN3 impact at this distance (assuming that the turbines and fire pump stacks are collocated) was 403.7 µg/m³. Similarly, SCREEN3 predicted a maximum offsite unitized fire pump impact under all meteorological conditions of 700.0 µg/m³ (for fire pump emissions of 1 g/s) at a distance of 74 meters. The maximum unitized turbine SCREEN3 impact at this distance was 3.502 µg/m³. Again, these unitized impacts were used to calculate maximum 1-hour pollutant impacts for the facility under all SCREEN3 meteorological conditions by multiplying the unitized impacts by the pollutant emission rates (in g/s) and adding the turbine and fire pump impacts together as shown in the following tables.

Table 10
SCREEN3 Impact Summary – Maximum Turbine Impacts for Normal Dispersion Conditions

Pollutant/Avg. Time	SCREEN3 Maximum Impacts at Turbine Maximum		
Pollutant/Avg. Time	Turbine Impacts (µg/m^3)	Fire Pump Impacts (µg/m^3)	Total Impacts (µg/m^3)
NOx / 1-hour	16.76	143.64	160.40
SO_2 / 1-hour	6.42	0.16	6.58
CO / 1-hour	20.40	11.10	31.50

Table 11
SCREEN3 Impact Summary – Maximum Fire Pump Impacts for Normal Dispersion Conditions

Pollutant/Avg. Time	Turbine Impacts (µg/m^3)	Fire Pump Impacts (µg/m^3)	Total Impacts (µg/m^3)
NOx / 1-hour	14.27	249.06	263.33

SO_2 / 1-hour	5.47	0.28	5.75
CO / 1-hour	17.38	19.25	36.63

The 1-hour inversion breakup fumigation impacts are less than the maximum overall SCREEN3 1-hour impacts for all pollutants, no further analysis of additional short-term averaging times (3-hour, 8-hour, or 24-hour) is required as described in Section 4.5.3 of *"Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised"* (EPA-454/R-92-019). The same is true of shoreline fumigation impacts for both NO_X and CO.

However, the 1-hour SO_2 shoreline fumigation impact for all facility sources is 10.68 µg/m^3, which is greater than the maximum SCREEN3 impact of 6.58 µg/m^3. Since shoreline fumigation can occur for some period of time (i.e., longer than the 90 minutes usually assumed to represent the limit for inversion breakup fumigation conditions), SO_2 impacts for longer averaging times (3-hours, 24-hour, and annual periods) were calculated by multiplying the total facility shoreline fumigation concentrations by the averaging time ratios described in Section 4.2 of *"Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised"* (EPA-454/R-92-019). This results in facility SO_2 fumigation impacts as shown in Table 12 (compared to the maximum facility SO_2 impacts predicted by the AERMOD modeling analyses).

Table 12
SO_2 Facility Impact Summary

Average Time	Shoreline Fumigation (µg/m^3)	AERMOD Maxima (µg/m^3)
1-hour	10.68	13.08
3-hours	9.59	6.16
24-hours	4.26	0.62
Annual	0.24	0.09

These facility SO_2 shoreline fumigation impacts, while greater than the AERMOD maxima for the 1-hour averaging period, are still less than the Significant Impact Levels (SILs).

Conclusion

The results of the AERMOD analysis of the RCEC project demonstrates that the proposed project will comply with all federal and California ambient air quality standards.