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State Of California **Natural Resources Agency**

Memorandum

Date: April 4, 2014
Telephone: (916) 654-4745
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To: **Commissioner Karen Douglas**, Presiding Member
Commissioner Janea A. Scott - Associate Member
Paul Kramer - Hearing Officer

From: **California Energy Commission -**
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Christine Stora, Compliance Project Manager
Siting, Transmission and Environmental Protection Division

Subject: **EL SEGUNDO ENERGY CENTER (00-AFC-14C)**
Energy Commission Staff's Errata to the Preliminary Staff Assessment for the El Segundo Power Facility Modification Amendment

Energy Commission staff is filing the enclosed Errata for Air Quality, Biological Resources, Public Health, and Hazardous Materials Management sections of the Preliminary Staff Assessment.(PSA). Edits are shown with ~~strikethrough~~ for removed text and new text is shown in **bold and underlined**. Staff is also adding Biological Resources-Appendix-1 Nitrogen Deposition Analysis that was inadvertently not included in the PSA.

cc: Docket (00-AFC-14C)

ERRATA TO AIR QUALITY

Page 4.1-45, the first paragraph under the heading "Environmental Justice Impacts", staff revises the text as follows:

Staff has considered the minority population surrounding the site and reviewed **Socioeconomics Figure 1** (see the **Socioeconomics** and **Executive Summary** sections of this PSA for further discussion of environmental justice), which shows the minority population within portions of the 6 mile buffer zone is greater than 50%**,** thus ~~would qualify~~ **qualifying** as **an** environmental justice population. **SOCIOECONOMICS Table 3** also shows that the **below** poverty**-**level **population** within six miles of the project site is **15.8 percent, which is comparable to the below-poverty-level population in the comparison geographies.** ~~24 percent which is meaningfully greater than comparison geographies in the local area and does constitute an environmental justice population as defined by *Environmental Justice: Guidance Under the National Environmental Policy Act*.~~

ERRATA TO BIOLOGICAL RESOURCES

Page 4.2-43, first complete paragraph, staff proposes changes as follows:

Based on a review of the baseline information and the results of modeling conducted by Air Quality staff, vegetation-specific critical loads for nitrogen deposition would not be exceeded in any locations with salt marsh habitat in the ESEC and ESPFM project vicinity, where the critical load ranges from 63 to 400 kg/ha/yr. This includes protected areas for the state and federally listed Belding's savannah sparrow. In addition, the critical load for coastal dunes would not be exceeded within most areas of critical habitat for western snowy plovers in the ESEC and ESPFM project vicinity. The critical load for coastal dunes ranges from 10 to 20 kg/ha/yr. Where the critical load for coastal dunes is exceeded within ~~the area near Marin del Rey where a California least tern colony is established and would not be exceeded most of~~ the critical habitat areas for western snowy plover within the ESPFM vicinity it was determined that there would be no significant impacts as, these areas are not subject to weed invasions due to the ongoing anthropomorphic use and regular maintenance of the beaches (pers com. Christine Medak). **In addition, the critical load would not be exceeded within the area in Marina del Rey where a California least tern breeding colony is established.** Therefore, nitrogen deposition impacts to western snowy plover **and California least tern** habitat will not be discussed further.

Page 4.2-48, fourth complete paragraph, staff proposes changes as follows:

The project site ~~and offsite laydown area are~~ **is an** industrial brownfield site~~s~~ with an operating power plant,~~s~~ **and the offsite laydown and parking areas are within industrial areas and most are existing parking and storage areas**, and vegetation is limited to weedy species and landscaping. Rare plants and special-status wildlife are not expected to occur onsite; however, nearby beaches and other natural areas support special-status birds including the western snowy plover (federally listed threatened), California least tern (federally and state-listed endangered), and California brown pelican (state fully protected). Given the proximity of the proposed project to the aforementioned biological resources, construction and operation would result in the direct and indirect effects presented in **Biological Resources Table 3**.

ERRATA TO PUBLIC HEALTH

Page 4.7-6, the third paragraph under the heading "ENVIRONMENTAL JUSTICE", staff revises the text as follows:

ENVIRONMENTAL JUSTICE

Staff established from the **2010** ~~1990~~ census data that the minority population within the project's six-mile impact area **is** ~~falls within a range between~~ **63.3** ~~4.9~~ percent **and is considered an environmental justice population.** ~~and 57.6percent, pointing to a relatively high percentage of minorities in this impact zone. Only 10.67 percent of the population in this six-mile zone lives below the poverty threshold, meaning that there would be no human differential pollutant exposures on the basis of economic status.~~ Since staff has established that no significant health impacts would result anywhere in the project area from the emission of the pollutants considered in this **Public Health** analysis, the issue of environmental justice would not arise in spite of potential exposures in the identified areas of relatively high minority populations. Issues of environmental justice are of potential concern only in cases of exposures of potential health significance.

ERRATA TO HAZARDOUS MATERIALS MANAGEMENT

1. Page 4.4-10, Second complete paragraph, staff proposes changes as follows:

Aqueous ammonia (29 percent) will be delivered via tanker to fill the existing 20,000 gallon double-walled UST while aqueous ammonia (19 percent) will be delivered by truck to fill the respective totes at Unit 5-8 for ESEC and Units 9 and 10 for GE Fast-start combustion turbine. The 20,000 gallon UST is located near the entrance to the facility and is approximately five (5) feet below grade, with the bottom of the tank located about 20 feet below grade. ~~The UST area is enclosed by a fenced area located near the entrance of the plant.~~ **The UST area is located near the entrance of the plant, and the pumps and fill valves/pipes are within a bermed area to collect any spilled material. Two pipes currently deliver 29.4 percent aqueous ammonia to the ammonia skids near the combustion turbines: a 1" diameter**

pipe and a 2" diameter pipe. Both are double-walled and have leak detection sensors in the space between the two pipe walls. The top of the UST is capped with concrete; a small driveway leads to the UST area from the plant entrance road and is used for offloading aqueous ammonia during deliveries and accessing for routine inspections/maintenance. No berm~~/curbed~~ **or curb encompasses the** area ~~encompass the top of the UST at~~ **where** the tanker off-~~loading point~~ **loads the aqueous ammonia**. A release during filling would migrate off the pad onto gravel and soil at the perimeter of the pad. The tanker truck connects via a flexible hose to the inlet and to vapor ports and this hose line from the tanker can immediately be manually shut off if a problem or spill occurs. El Segundo Generating Station has been under the oversight of the CUPA (El Segundo Fire Department) for inspections and RMP reviews and updates since this system has been in service~~,~~ **(which was** pre-licensing of the El Segundo Power Redevelopment Project**)**.

2. Page 4.4-12, third complete paragraph**, staff adds the following text:**

Accordingly, staff ~~proposes~~ **would normally propose** mitigation to reduce this potential impact on the off-site public to a less than significant level~~. Staff proposes three~~ **One of the** options ~~in proposed new Condition of Certification **HAZ-6** for the project owner to implement. Implementing any one of these options would prevent a spill of 29.4 percent~~ **that staff would propose in a situation such as this would be to require that both the current pipes and any new** aqueous ammonia **pipes running** from ~~having any significant impact to off-site public. These options include~~ **the ammonia tank to the ammonia skids near each combustion turbine be double-walled with leak detection in the space between the two walls. But since the project already uses such piping (which staff finds to be the best** engineering ~~controls to prevent spills or limit the extent of spills of aqueous ammonia grate and that drains~~ **solution available) and plans** to **do so in the future as the modified project is constructed and operated, staff finds that the risk of** a ~~subsurface sump~~ **release and resultant off-site consequence to the public is so remote as to be considered less than significant. Therefore, staff does not propose any further mitigation regarding piping except to require that all new piping shall be the same as existing piping, that is, double walled with leak detection in the space between the walls. This proposal can be found in new Condition of Certification HAZ-6**.

3. Page 4.4-15, after first complete paragraph and before the heading "Seismic Issues", staff adds the following text:

Based on the environmental mobility, toxicity, the quantities at the site, and the use of an UST and totes, staff concludes that the risk associated with the transportation of hazardous materials to the proposed modified project is less than significant. The risk of a spill while transferring aqueous ammonia from the tanker truck to the UST or the totes remains the greatest risk and therefore staff also is proposing in newly proposed HAZ-6 that the project owner (or the delivery vendor) provide and utilize a portable spill catchment basin whenever

a tanker is off-loading 29.4 percent aqueous ammonia into the underground storage tank or 19 percent aqueous ammonia to the totes so as to capture any spills from the tanker, truck, or transfer hoses.

4. Page 4.4-19, fourth complete paragraph is changed, staff makes the following changes:

Staff at this time recommends that two existing Conditions of Certification, **HAZ-1** and **HAZ-2** be retained but revised to reflect current nomenclature, current Energy Commission practice, and to clarify certain requirements for hazardous materials plans. Condition of Certification **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in **Appendix B** of this section, unless there is prior approval by the CPM. Condition of Certification **HAZ-2** ensures that local emergency response services are notified of the amounts and locations of hazardous materials at the facility and that a Hazardous Materials Business Plan (HMBP), RMP, and SPCC Plan are developed and implemented. Staff also recommends the deletion of existing Condition **HAZ-3** because the requirements contained therein have been incorporated into **HAZ-2**. Staff instead proposes a new Condition of Certification **HAZ-3** that would require the development of a SMP that addresses the delivery of all liquid hazardous materials during the demolition, construction, commissioning, and operation of the project thus further reducing the risk of any accidental release not specifically addressed by the proposed spill prevention mitigation measures, and also preventing the mixing of incompatible materials that could result in the generation of toxic vapors. New Condition of Certification **HAZ-4** addresses the use of natural gas and prohibits its use to clear pipes and is mandated or strongly recommended by the United States Chemical Safety and Hazard Board (CSB), OSHA, NFPA, and the American Society of Mechanical Engineers (ASME). Site security, which already exists because it is an operating power plant, will nevertheless be required to be reviewed and updated in proposed new Condition of Certification **HAZ-5**. It is recommended that these security measures be implemented not later than sixty days after the Petition is approved. And finally, staff proposes new condition **HAZ-6** which would require ~~that engineering controls be implemented to ensure that in the event~~ **the continued use** of ~~a spill~~ **double-walled pipes for the transfer** of 29.4 percent aqueous ammonia **from the UST and portable catchment basins to collect and limit the spread of any spilled aqueous ammonia (29.4 or 19 percent) when transferring these hazardous materials from a delivery truck to a tank or tote. In this manner**, no significant airborne concentration would migrate off-site to impact residents living to the south of the power plant.

5. Page 4.4-22, HAZ-5 item # 1 only, staff makes the following change:

The Security Plan shall include the following:

1. Permanent full perimeter fence or wall, at least eight feet high; and topped with barbed wire or the ~~equivalent~~ **current metal spikes;**

6. Page 4.4-24, Condition HAZ-6. Staff makes the following changes:

HAZ-6 The project owner shall:

1. ~~Design~~ **Continue** to use and install ~~one of~~ **double-walled piping with leak detection between the** ~~following options~~ **pipe walls for the** ~~control of spills of 29.4 percent~~ **pipes that transfer aqueous** ~~-~~**ammonia** ~~during transfer via pipeline~~ **from the underground storage tank to the ammonia skids at each skid location**~~:~~**.**

~~a. install double-walled piping~~

~~b. bury piping in the ground~~

~~**c.** place the piping in a lined trench that is covered with a grate and that drains to a subsurface sump~~

2. Provide or require the ammonia deliver vendor to provide and utilize a portable spill catchment basin whenever a tanker is off-loading 29.4 percent aqueous ammonia into the underground storage tank or a truck is delivering 19 percent aqueous ammonia to fill the totes so as to capture any spills from the tanker, truck, or the transfer hose.

3. Prepare and implement a Spill Capture Plan that includes procedures and methods to cover, contain, and remove any spilled 29.4 or 19 percent aqueous ammonia from the ground, trench, sump, or portable spill container within a time-frame of not less than 30 minutes.

Verification: Within thirty (30) days of the Commission Decision to approve the amendment, the project owner shall provide :

- proof that a portable spill catchment basin has been purchased; or
- the ~~design drawings~~ contract that requires the vendors to provide such a portable basin; and
- the Spill Capture Plan to the CPM for review and approval. Within sixty (60) days after receiving approval from the CPM, the project owner shall provide proof that the mitigation described has been implemented.

BIOLOGICAL RESOURCES-APPENDIX-1
NITROGEN DEPOSITION ANALYSIS

Wenjun Qian, Ph.D., P.E.

INTRODUCTION

The following provides a technical description of the preliminary nitrogen deposition analysis for the El Segundo Power Facility Modification (ESPFM) project.

PROJECT DESCRIPTION

The facility owner of El Segundo Energy Center (ESEC) proposes to replace existing boiler Units 3 and 4 with a GE 7FA combined-cycle gas combustion turbine generator with heat recovery steam generator (HRSG) and two Rolls Royce Trent 60 simple-cycle gas turbines. Cooling for the combined-cycle unit would be provided by a Heller dry cooling tower system. The combined-cycle unit would also include a small auxiliary boiler rated at 36 MMBtu/hr to reduce start-up duration.

NITROGEN DEPOSITION

Nitrogen deposition is the term used to describe the input of reactive nitrogen species from the atmosphere to the biosphere. The pollutants that contribute to nitrogen deposition derive mainly from oxides of nitrogen (NOX) and ammonia (NH3) emissions. NOX emissions (a term used for nitric oxide [NO] and nitrogen dioxide [NO2]), generally the result of industrial or combustion processes, are much more widely distributed than NH3. Reduced forms of nitrogen (NHx) are primarily emitted from intensive animal operations (e.g., dairies) and vehicles with the introduction of catalytic converters.

In the atmosphere NOX is transformed to a range of secondary pollutants, including nitric acid (HNO3), nitrates (NO3) and organic compounds, such as peroxyacetyle nitrate (PAN), while NH3 is readily absorbed by surfaces such as water and soil as well as being rapidly transformed to ammonium (NH4+) by reaction with acidic compounds. Both the primary and secondary nitrogen-based pollutants may be removed by wet deposition (scavenging of gases and aerosols by precipitation) and by dry deposition (direct turbulent deposition of gases and aerosols) on the earth's surface.

NITROGEN DEPOSITION MODELS

Staff used the American Meteorological Society/Environmental Protection Agency Regulatory Model known as AERMOD to evaluate the potential nitrogen deposition impacts of this power plant project. AERMOD is a steady-state Gaussian plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and is applicable for use in both simple and complex terrain.

AERMOD does not account for the transformation of the nitrogen species which are time and reaction dependent. Therefore, it is a conservative model that overestimates deposition impacts. But, it is also approved for regulatory purposes for near-field impacts analyses (used by the Energy Commission and the air district), is most familiar to users and regulatory agencies, and it is generally used to estimate nitrogen deposition. Staff also used several assumptions with regard to nitrogen formation and deposition, which tend to further overestimate impacts. These assumptions include:

- 100 percent conversion of oxides of nitrogen (NOx) and ammonia (NH_3) into atmospherically derived nitrogen (ADN) within the exhaust stacks rather than allowing the conversion of NOx and NH_3 to occur over distance and time within the plume and atmosphere, which is beyond the scope of AERMOD;

- Depositional rates and parameters based upon nitric acid (HNO_3), which, of all the depositional species, has the most affinity for soils and vegetation and the tendency to adhere to what it is deposited on;

- Maximum settling velocities to produce maximum, or conservatively estimated, deposition rates;

- Emissions rates based upon the proposed facility's maximum potential to emit as required by California Environmental Quality Act (CEQA), rather than annually averaged likely emissions based on previous equipment performance and actual operations, in the calculation of nitrogen deposition; and

- Ammonia emissions are estimated to average 2.5 ppm, while the permit level is 5 ppm. In reality, ammonia emissions are generally less than 1 ppm over the life of the catalyst. Plant operators have an extraordinary impetus to avoid exceedances of their NOx permit limits, because they can be fined. Owners keep their catalyst clean and active, which keeps NOx level low and limits unreacted ammonia in the exhaust.

Assuming 100 percent of the NOx and NH_3 conversion to ADN within the exhaust stacks ignores the fact that it requires sunlight, moisture, and time for the nitrogen compounds to convert to ADN. Since staff analyzes habitat areas within a 6 mile radius of the project, it is unlikely that there would be sufficient time for the emitted nitrogen to convert to ADN. Therefore, it is likely that a less than significant amount of the project's nitrogen emissions would actually deposit on these habitat areas. However, at this time staff does not have refined data on the time needed for this conversion to occur. Therefore, staff conservatively assumes total conversion at the stack. The project would contribute to regional nitrogen deposition, but not at the levels predicted by AERMOD due to the limited time it takes for the plumes to travel to the habitat areas and the conservative assumptions used for nitrogen formation and deposition.

For average meteorological conditions, it would take the ESPFM plumes less than 2 hours to reach the furthest habitat of interest. However, in urban atmospheres, the oxidation rate of NOx to HNO_3 is approximately 20 percent per hour, with a range of 10 to 30 percent per hour (ARB 1986). Nighttime NOx oxidation rates are generally much lower than typical daytime rates. HNO_3 is readily taken up by soil, vegetation, and water surfaces. HNO_3 also reacts with gaseous NH_3 to form ammonium nitrate (NH_4NO_3), but the reaction is reversible and dependent on temperature, relative humidity, and concentrations of other pollutants. The ambient concentration of nitrate is limited by the availability of NH_3 which is preferentially scavenged by sulfate (Scire et al 2000).

On the other hand, because NH_3 is readily taken up by damp soils and vegetation and by water bodies, a significant portion of the emitted NH_3 can be deposited to vegetation depending on the type of land cover and on meteorological conditions (Hatfield and Follett 2008). NH_3 is also readily taken up by aerosol particles of sulfuric acid (H_2SO_4) to form ammonium sulfate ($(NH_4)_2SO_4$ [Metcalfe et al 1999]). But since most $(NH_4)_2SO_4$ particles deposit to ground by rain, it is likely that less than significant amount of the $(NH_4)_2SO_4$ particles would actually deposit on the habitat areas within the 6 mile radius of the project (the average rainfall in El Segundo is about 12.8 inches, with the majority falling between December and March). Instead, the $(NH_4)_2SO_4$ particles may travel hundreds and thousands of miles away from the project before they deposit on the earth's surface.

The Energy Commission's 2007 report *Assessment of Nitrogen Deposition: Modeling and Habitat Assessment* (Tonnesen et al 2007) reviewed two other air dispersion models, which can represent chemical speciation and formation of aerosols: CALPUFF and the Community Multiscale Air Quality (CMAQ) model for nitrogen deposition modeling. The CMAQ version used in the report sometimes produced relatively large numerical error thus the report concluded that CMAQ cannot be used reliably for single point source sensitivity simulations.

CALPUFF is a non-steady-state Lagrangian Gaussian puff dispersion model that simulates the effects of time- and space-varying meteorological conditions on pollution transport, transformation, and removal by modeling parcels of air as they move along their trajectories. Different from AERMOD, CALPUFF uses simplified chemistry to attempt to represent nitrogen partitioning with relatively low computational cost compared to CMAQ. The Energy Commission's 2007 report concluded that the CALPUFF model can be used to simulate nitrogen deposition, and its results were generally similar in magnitude to the CMAQ-simulated nitrogen deposition. However, CALPUFF is more appropriate for long-range transport (i.e., greater than 50 kilometers – at less than 50 km, and for complex terrain, it requires regulatory approval for its use by the relevant reviewing agency). In addition, CALPUFF allows users to define certain parameters in its meteorological processor, which makes it difficult to be standardized for regulatory review purposes at the current stage.

Both AERMOD and CALPUFF have strengths and weaknesses in modeling nitrogen deposition as mentioned above. Based on staff's modeling experience and U.S. Fish

and Wildlife Service's analysis on the Russell City Energy Center Project (USFWS 2010), nitrogen deposition rates at habitat areas within 6 miles of the project predicted from CALPUFF are usually an order of magnitude lower (i.e., $1/10^{th}$) than those from AERMOD. At this time, staff continues to believe AERMOD, with the overlay of conservative assumptions mentioned above, is the most conservative model to use for nitrogen deposition modeling.

NITROGEN DEPOSITION IMPACTS AND MITIGATION CALCULATIONS

In the 2002 Final Staff Assessment (FSA [CEC 2002a]) for the original El Segundo Power Redevelopment Project (00-AFC-14), staff concluded that the cumulative nitrogen deposition impact of then-projected ESEC facility would be less than significant. In the September 3, 2013 letter to Energy Commission[1], the facility owner stated that the projected NOx emissions from the future ESEC facility would be well below those analyzed in the 2002 FSA. The facility owner does not expect that the ESPFM would contribute significantly to the cumulative regional nitrogen deposition rates. However, staff noticed that the 2002 FSA did not include NH_3 in the total nitrogen emissions estimation. Staff requested the facility owner to include NH_3 in the total nitrogen emissions estimation for purposes of fully evaluating nitrogen deposition. The facility owner provided a detailed list of the nitrogen emissions (for both NOx and NH_3) associated with Energy Commission proceedings for ESEC (LL 2013o). The facility owner concluded that the total nitrogen emissions projected at the future ESEC facility would be less than the total nitrogen emissions that Energy Commission evaluated and authorized in previous ESEC proceedings. The facility owner believes further modeling analysis is not necessary and the modified ESEC facility would have a less-than-significant nitrogen deposition impact.

Staff is still concerned that different exhaust stack parameters from different units may result in higher nitrogen deposition impacts even though the nitrogen emissions would be lower. Thus Air Quality staff did its own analysis using AERMOD to evaluate and compare the nitrogen deposition impacts from the projected future ESEC units (Units 5 through 12 and auxiliary boiler) and those from the units remaining and approved by the 2010 Commission Decision to the Amendment (CEC 2010a), which include the remaining part of Unit 3 (based on the remaining megawatts to be replaced, more details are discussed in the **Air Quality** section), Unit 4, and Units 5 through 8. Staff found the nitrogen deposition impacts from the projected future ESEC units would be lower than those from the units remaining and approved by the 2010 Commission Decision.

Staff emphasizes that its modeling provides an overestimation of nitrogen deposition of the project, based on conservatisms layered upon conservatisms. However, it is the best tool we currently have that is accepted to provide a consistent, albeit extremely conservative result.

[1] TN# 200394, Re: El Segundo Energy Center Petition to Amend (00-AFC-14C) Applicant's Objections to Certain Data Requests in Set One [#1-83] and Request for Extension to Submit Data Response 87 Contained in Set 2 (#84-87), dated September 3, 2013.

Staff used the conservatively modeled project nitrogen deposition impact and baseline nitrogen deposition (see more descriptions regarding baseline below) to compute the total nitrogen deposition rates on habitat areas. The results could be used to assess the extent of affected habitat to include areas where the total nitrogen deposition exceeds the critical load for each vegetation type. Staff considers that vegetation types below critical load are not significantly impacted by the project and does not require mitigation (see more details in the **Biological Resources** section). The baseline nitrogen deposition rates used in staff's analysis are based on emission inventory for calendar year 2002 (see more details below). Staff believes that additional conservatisms are introduced by using the 2002 baseline nitrogen deposition rates as discussed below.

California and South Coast Air Basin Baseline Nitrogen Deposition

The baseline nitrogen deposition rates used in staff's analysis are from the Energy Commission's 2007 report (Tonnesen et al 2007), which provided the total nitrogen deposition on a rather coarse 4-km (2.5-mile) grid (4 km x 4 km, or 16 km^2) throughout California. The report used emission inventory data that were previously developed through the Western Regional Air Partnership (WRAP) to simulate annual air quality and visibility for calendar year 2002. The source categories included for the calendar year 2002 include: area sources, point sources, mobile sources, non-road mobile sources, road dust, off shore sources, Mexico emissions inventory, and biogenic emissions for Volatile Organic Compounds (VOC).

However, the U.S. EPA's enforcement efforts, implemented through the State Implementation Plan (SIP) enforced by the regional air districts' Air Quality Management Plan (AQMP, see more details in the **Air Quality** section), have significantly reduced nitrogen emissions from mobile and stationary sources sectors since 2002, and will continue those downward trends. **Appendix Bio-1 Figures Ndep-1a** and **Ndep-1b** show that both the actual and forecasted nitrogen emissions calculated from the NOx and NH_3 emissions (red solid lines) for all sources in South Coast Air Basin decrease significantly from year 2000 to year 2035. The nitrogen emissions from the NOx and NH_3 emissions are based on the mass fraction of nitrogen in NOx and NH_3. It should be noted that nitrogen constitutes about 82 percent of NH_3 by weight while it only constitutes about 30 percent of NOx by weight.

The emissions from stationary sources, including electric generation facilities, are also presented (green dashed lines) in the figures for comparison. NOx emissions from the stationary sources only account for 8 to 22 percent of those from all sources and also show a steady decrease over the years. Although the NH_3 emissions from the stationary sources, mainly waste disposal and fuel combustion, show a slight increase, they only account for 22 to 47 percent of the total emissions from all sources. The majority of the NOx emissions come from mobile sources and the majority of the NH_3 emissions come from area wide sources such as livestock operations, fertilizer applications, and mobile sources.

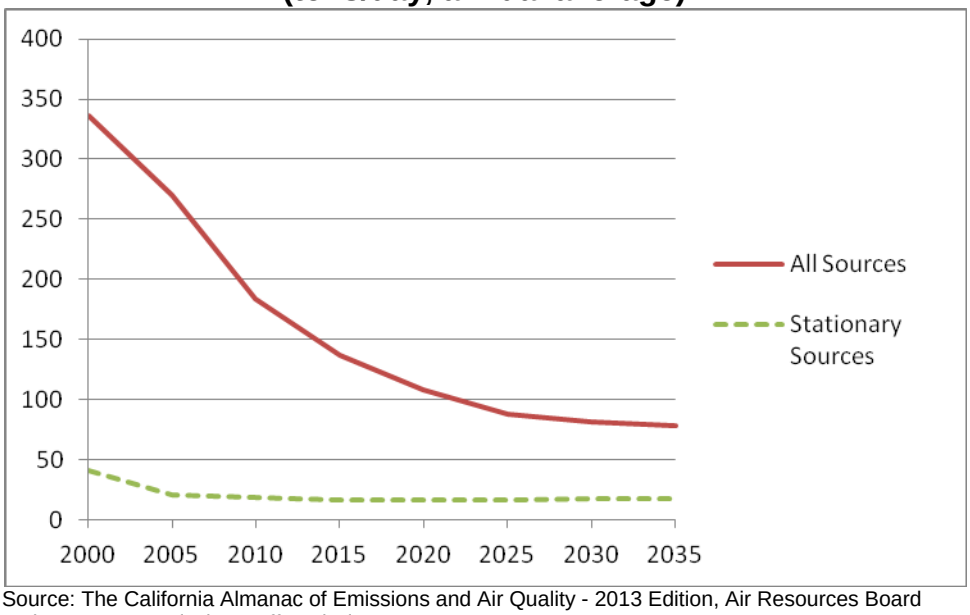
Appendix Bio-1 Figures Ndep-2 shows measured annual averaged nitrates (NO_3) and sulfates (SO_4) concentrations of dry particles at the San Gabriel monitoring station (located in South Coast Air Basin) from the Interagency Monitoring of Protected Visual Environments (IMPROVE) network. This is representative of depositional particles in ambient air at the station. The nitrates concentrations have decreased more than 50 percent from 2002 to 2012. The general trend of the sulfate concentrations is also decreasing. The sulfates concentrations have decreased about 30 percent from 2002 to 2012. This indicates that the reductions in the nitrogen emissions shown in **Appendix Bio-1 Figures Ndep-1a** and **Ndep-1b** are effective in reducing the background nitrates and sulfates in the South Coast Air Basin.

Considering the decreasing nitrogen emission inventory trend (an overall reduction of over 50 percent from 2002 to 2014, shown in **Appendix Bio-1 Figures Ndep-1a** and **1b** from the two trends for all sources combined), the relatively small contribution from the stationary sources, and the decreasing nitrates and sulfates concentration measurements, the use of 2002 emissions inventory in the baseline nitrogen deposition rates (as discussed in **Biological Resources** probably overestimates baseline deposition by a factor of 2. Certain map zones that staff considered would be significantly impacted by the project, based on overestimated baseline as well as overestimated project impact, might have total nitrogen deposition below critical load. Thus the acreage of affected habitat is probably overestimated using 2002 baseline and conservatively estimated project impacts.

Staff assumes that total nitrogen loading is directly proportional to NOx and ammonia inventories. Since deposition pathways are complex and dependent on components such as time, humidity, sunlight exposure, and uniform mixing of needed reactants, deposition rates at the habitat areas near the project may be reduced more than the percentage change to nitrogen inventories.

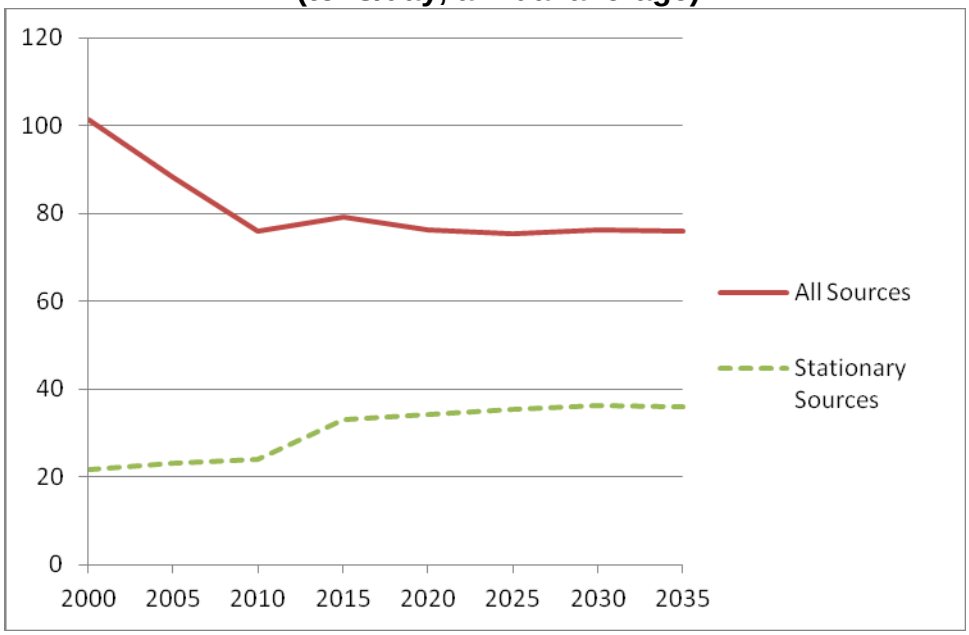
In addition, the South Coast Air Quality Management District (SCAQMD) implemented the Regional Clean Air Incentives Market or RECLAIM on January 1, 1994. Facilities subject to this program, such as ESEC, are required to purchase RECLAIM Trading Credits (RTCs) to offset their annual NOx emission increase in a 1-to-1 offset ratio. As a result, any new stationary source like ESPFM would not result in a net increase in NOx emissions basin wide (see details in the **Air Quality** section regarding ESPFM RECLAIM participation and compliance). In addition, since ESPFM would be located in Zone 1 (South Coast Air Basin coastal zone) RTCs may only be obtained from Zone 1. The resulting new emissions (potential NOx increases) from ESPFM and the required RTCs (NOx reductions or offsets) would be balanced to zero, or no net increase, annually in the more local coastal zone. So the baseline nitrogen from NOx would not change due to NOx emissions from ESPFM.

Appendix Bio-1 Figure Ndep-1a
Nitrogen portion[a] of the NOx Emissions Trends in South Coast Air Basin (tons/day, annual average)



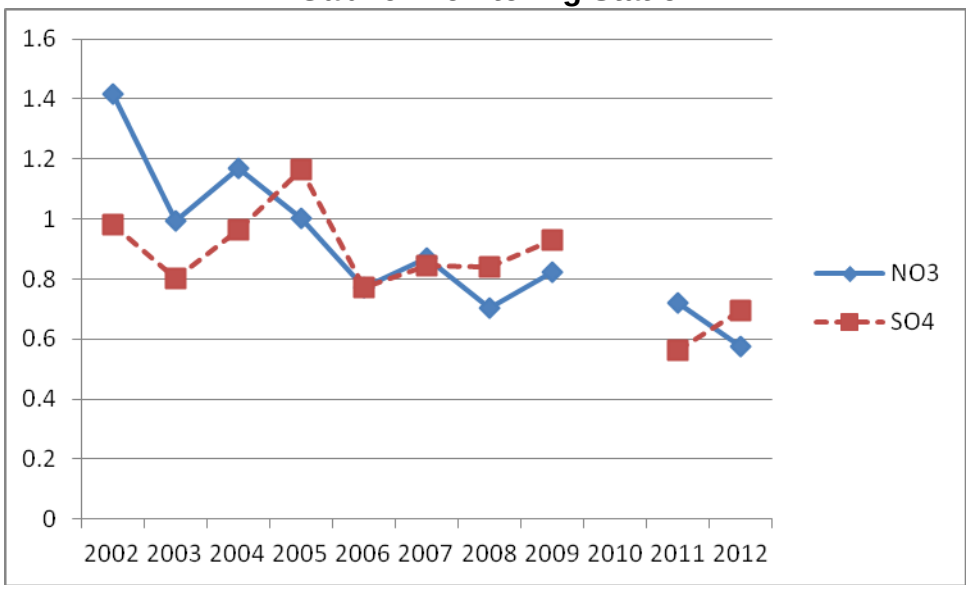
Source: The California Almanac of Emissions and Air Quality - 2013 Edition, Air Resources Board and Energy Commission staff analysis
Note: [a] The nitrogen portion of the NOx emissions is calculated based on the ratio between the molecular weight of nitrogen (14) and the molecular weight of NO_2 (46).

Appendix Bio-1 Figure Ndep-1b
Nitrogen portion[a] of the NH_3 Emission Trends in South Coast Air Basin (tons/day, annual average)



Source: The California Almanac of Emissions and Air Quality - 2013 Edition, Air Resources Board and Energy Commission staff analysis
Note: [a] The nitrogen portion of the NH_3 emissions is calculated based on the ratio between the molecular weight of nitrogen (14) and the molecular weight of NH_3 (17).

Appendix Bio-1 Figure Ndep-2
Nitrates (NO_3) and Sulfates (SO_4) Concentrations ($\mu g/m^3$) Measured at San Gabriel Monitoring Station



Source: Interagency Monitoring of Protected Visual Environments (IMPROVE) and Energy Commission staff analysis

CONCLUSIONS

While staff can calculate a nitrogen deposition rate from the project, staff believes the modeling tools and background deposition rates identify a much higher rate of nitrogen deposition than is reasonably expected to occur. For more information on this, refer to the **Biological Resources** section of this document.

The total nitrogen emissions projected at the future ESEC facility would be less than the total nitrogen emissions that Energy Commission evaluated and authorized in previous ESEC proceedings. Staff's own analysis in the **Biological Resources** section shows that the nitrogen deposition impacts from the projected future ESEC facility would less than significant as were the impacts for the ESEC facility certified by the 2010 Commission Decision.

Staff believes that because AERMOD does not account for the transformation of the nitrogen species, which is time and reaction dependent, the nitrogen deposition impacts of the project have been overestimated by as much as a factor of 10 using AERMOD. Further, the nitrogen emission inventory in the South Coast Air Basin has decreased more than 50 percent from 2002 to 2014 for oxides of nitrogen and ammonia combined. The use of the 2002 emissions inventory in the baseline nitrogen deposition rates probably overestimates baseline nitrogen deposition by a factor of 2. In addition, ESPFM is required to purchase RTCs to offset their annual NOx emissions on a 1-to-1 offset ratio. ESPFM would not result in a net increase in NOx emissions in South Coast Air Basin coastal zone. Lastly, ammonia emissions were modeled at a rate 2.5 times higher in the modeling than what is reasonably expected.

REFERENCES

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