

SUMMARY OF AIR QUALITY IMPACT ANALYSIS FOR THE DELTA ENERGY CENTER

June 18, 2003

BACKGROUND

The Delta Energy, LLC has submitted a permit application (# 7068) for a change in permit conditions from a nominal 880-MW combined cycle power plant. The Delta Energy Center is located in Pittsburg, CA with the following UTM coordinates (601.495 E, 4208.121 N). This facility has been previously permitted (permit applications #19414 and #5813). This permit application is for an increase in the gas turbine start-up duration period and emission rates. The applicant found that it can take up to six hours for the gas turbine to come into compliance with the permitted NO_x and CO emission rates rather than the 180 minutes as specified in the original permit conditions. While the short-term hourly emission rates will increase during cold start-up conditions, the applicant is agreeing to the previously permitted daily and annual emission levels. Cold start-ups are allowed up to three times a year. Also, there will be no change in any of the other equipment or any of the other operating modes as a result of this permit application. The facility is composed of three natural gas-fired turbines, three heat recovery steam generators each equipped with duct burners, an emergency generator and a fire pump engine. The facility also includes a 14 cell cooling tower. Natural gas will be the only fuel consumed except for the Diesel fire pump. As a result of the change in permit conditions, the one- and eight-hour CO and the one-hour NO₂ impacts for the entire project were reevaluated.

AIR QUALITY IMPACT ANALYSIS REQUIREMENTS

Requirements for air quality impact analysis are given in the District's New Source Review (NSR) Rule: Regulation 2, Rule 2.

The criteria pollutant annual worst case emissions for the Project were provided by the Delta Energy Center and are listed in Table I, along with the corresponding significant emission rates for air quality impact analysis.

Table I
Comparison of proposed project's annual worst case emissions
to significant emission rates for air quality impact analysis (tons/year)

Pollutant	Proposed Project's Emissions	Significant Emission Rate (Reg-2-2-304 to 2-2-306)	EPA PSD Significant Emission Rates for major stationary sources
NO _x	279.8	100	40
CO	1107.5	100	100
PM ₁₀	145.6	100	15
SO ₂	18.62	100	40

Table I indicates that the proposed project emissions exceed the significant emission levels for nitrogen oxides (NO_x), carbon monoxide (CO), and respirable particulate matter (PM₁₀). Therefore, this source is classified as a major stationary source as defined under the Federal Clean Air Act. Because it is a major source, the air quality impact of the facility must be investigated for all pollutants emitted in quantities larger than the EPA PSD significant emission rates (shown in the last column of Table I). These pollutants are NO_x, CO, and PM₁₀.

The change in permit conditions in this permit application does not effect the daily or annual PM₁₀ emission rates. (The cold start-up conditions do not increase the daily or annual PM₁₀ emission rates.) The PM₁₀ ambient impacts therefore will not change from the previously permitted facility (permit application #5813) and are not included in this analysis. The detailed requirements for an air quality impact analysis are given in Sections 304, 305 and 306 of the District's NSR Rule and 40 CFR 51.166 of the Code of Federal Regulations.

An applicant for a permit that requires an air quality impact analysis such as the Delta Energy Center, must also, according to Section 417 of the NSR Rule, provide an analysis of the impact of the source and source-related growth on visibility, soils and vegetation. These analyses are also included in this report.

AIR QUALITY IMPACT ANALYSIS SUMMARY

The required contents of an air quality impact analysis are specified in Section 414 of Regulation 2 Rule 2. According to subsection 414.1, if the maximum air quality impacts of a new or modified stationary source do not exceed significant levels for air quality impacts, as defined in Section 2-2-233, no further analysis is required. If the maximum impact for a particular pollutant is predicted to exceed the significant impact level, a full impact analysis is required that includes the estimation of background pollutant concentrations and, if applicable, a PSD increment consumption analysis. EPA also requires a Class I increment analysis of any PSD source which increases NO₂ or PM₁₀ concentrations by 1 µg/m³ or more (24-hour average) in a Class I area.

Air Quality Modeling Methodology

Maximum ambient concentrations of NO₂ and CO were estimated for various plume dispersion scenarios using established modeling procedures. These scenarios include simple terrain impacts (for receptors located below stack height), complex terrain impacts (for receptors located at or above stack height), impacts due to building downwash, impacts due to inversion breakup fumigation, and impacts due to shoreline fumigation.

Emissions from the turbines will be exhausted from three 144 foot exhaust stacks. Table II shows the emission rates used in modeling. They include: turbine commissioning, turbine start-up, maximum 1-hour, maximum 8-hour and maximum annual average. These estimated emission rates are taken from Tables 3 and 4 of the February 2003 permit application submitted by Sierra Research, Inc. Commissioning is the original startup of one of the turbines without controls and only occurs during the initial operation of the equipment after installation. Start-up is the

beginning of any of the subsequent duty cycles to bring the facility from idle status up to power production.

The EPA models SCREEN3 (version 96043), ISCST3 (version 00101), and CTSCREEN (version 94111) were used in the air quality impacts analyses. A land use analysis of the facility and its surroundings showed that the use of the rural dispersion coefficients is appropriate. Six years of the most recently available hourly meteorological data from a Pacific Gas and Electric Company meteorological monitoring station were used in the modeling analysis (1994-1999). This monitoring site, the closest monitoring site to the project, is located roughly four miles to the west of the project and is representative of the project site meteorology. Because the exhaust stacks are less than Good Engineering Practice (GEP) stack height, ambient impacts due to building downwash were evaluated. Because complex terrain was located nearby, complex terrain impacts were included. Inversion breakup fumigation was evaluated using the SCREEN3 model. Shoreline Fumigation was evaluated using SCREEN3. The Ozone Limiting Method was used to convert one-hour NO_x impacts into one-hour NO₂ impacts. The corresponding six years of ozone data (1994 through 1999) from the Pittsburg 10th Street Monitoring Station were used in the ozone limiting method calculations. The Ambient Ratio Methodology (with a default NO₂/NO_x ratio of 0.75) was used for determining the annual-average NO₂ concentrations.

Table II
 Averaging period emission rates used in modeling analysis (g/s)

Pollutant Source	Max (1-hour)	Commissioning ¹ (1-hour)	Start-up ² (1-hour)	Maximum (8-hour)	Maximum Annual Average
NO _x					
Turbine/DB 1	2.42	45.6	37.8	n/a	2.675
Turbine/DB 2	2.42		2.42		2.675
Turbine/DB 3	2.42		2.42		2.675
Em Gen	0.617				0.0141
Fire Pump	0				0.00560
CO					
Turbine/DB 1	5.89	466.2	466.2	155.0	n/a
Turbine/DB 2	5.89		5.89	116.6	
Turbine/DB 3	5.89		5.89	5.89	
Em Gen	1.68			0.209	
Fire Pump	0			0	

¹ Commissioning is the original startup of the turbines and only occurs during the initial operation of the equipment after installation. The 1-hour NO_x and CO emissions are based on cold startup of one turbines with no controls. ²Start-up is the beginning of any of the subsequent duty cycles to bring the facility up to power production: one turbine in cold start-up mode and two turbines at base load.

Air Quality Modeling Results

The maximum predicted ambient impacts of the various modeling scenarios described above are summarized in Table III for the averaging periods for which AAQS and PSD increments have been set. Shown in Figure 1 are the locations of the maximum modeled impacts.

Also shown in Table III are the corresponding significant ambient impact levels listed in Section 233 of the District's NSR Rule. In accordance with Regulation 2-2-414 further analysis is required only for those pollutants for which the modeled impact is above the significant air quality impact level. It can be seen in Table III that the 1-hour NO₂ and 1- and 8-hour CO modeled impacts are above the significant air quality impact level and therefore require further analysis.

TABLE III
 Maximum predicted ambient impacts of proposed project (µg/m³)
 [Overall maximum in bold type]

Pollutant	Avg Time	Commissioning Maximum Impact	Break-up Fumigation	Startup	Maximum Modeled Impact	Shoreline Fumigation Impact	Significant Air Quality Impact Level
NO ₂	1-hour	133 ²	15.5 ¹	132 ²	185 ²	61.4 ¹	19
	annual	-	-	-	0.79 ³	-	1.0
CO	1-hour	586	39.2	2553	5085	153	2000
	8-hour	633	338	633	405	-	500

¹One-hour average NO₂ impacts based on the conservative assumption that all of the plume NO_x is in the form of NO₂.

²Modeled using the ozone limiting method version of the ISC3 model. Corresponding ozone data is from the Pittsburg monitoring station. ³Annual average NO₂ impacts determined using the EPA approved value of 0.75 for the annual average NO₂/NO_x ratio.

Background Air Quality Analysis

Three District operated monitoring stations, Pittsburg, Concord, and Bethel Island were chosen as representative of the background CO and NO₂ concentrations. Table IV contains the concentrations measured at the three sites for 1997 through 2001.

TABLE IV
 Background concentrations ($\mu\text{g}/\text{m}^3$) at Pittsburg, Concord
 and Bethel Island monitoring sites for 1997-2001 (maximums are in bold print)

Monitor	Highest 1-hour CO concentration	Highest 8-hour CO concentration	Highest 1-hour NO ₂ concentration
Pittsburg			
1997	6,325	3,722	132
1998	5,290	3,092	120
1999	7,130	3,815	164
2000	5,635	3,127	102
2001	5,980	2,847	117
Concord			
1997	6,555	3,535	143
1998	6,555	4,375	124
1999	5,635	3,628	148
2000	5,175	3,150	139
2001	5,060	3,115	122
Bethel Island			
1997	2,185	1,762	90
1998	2,185	1,832	100
1999	2,070	1,633	100
2000	2,645	1,785	81
2001	2,875	1,750	83

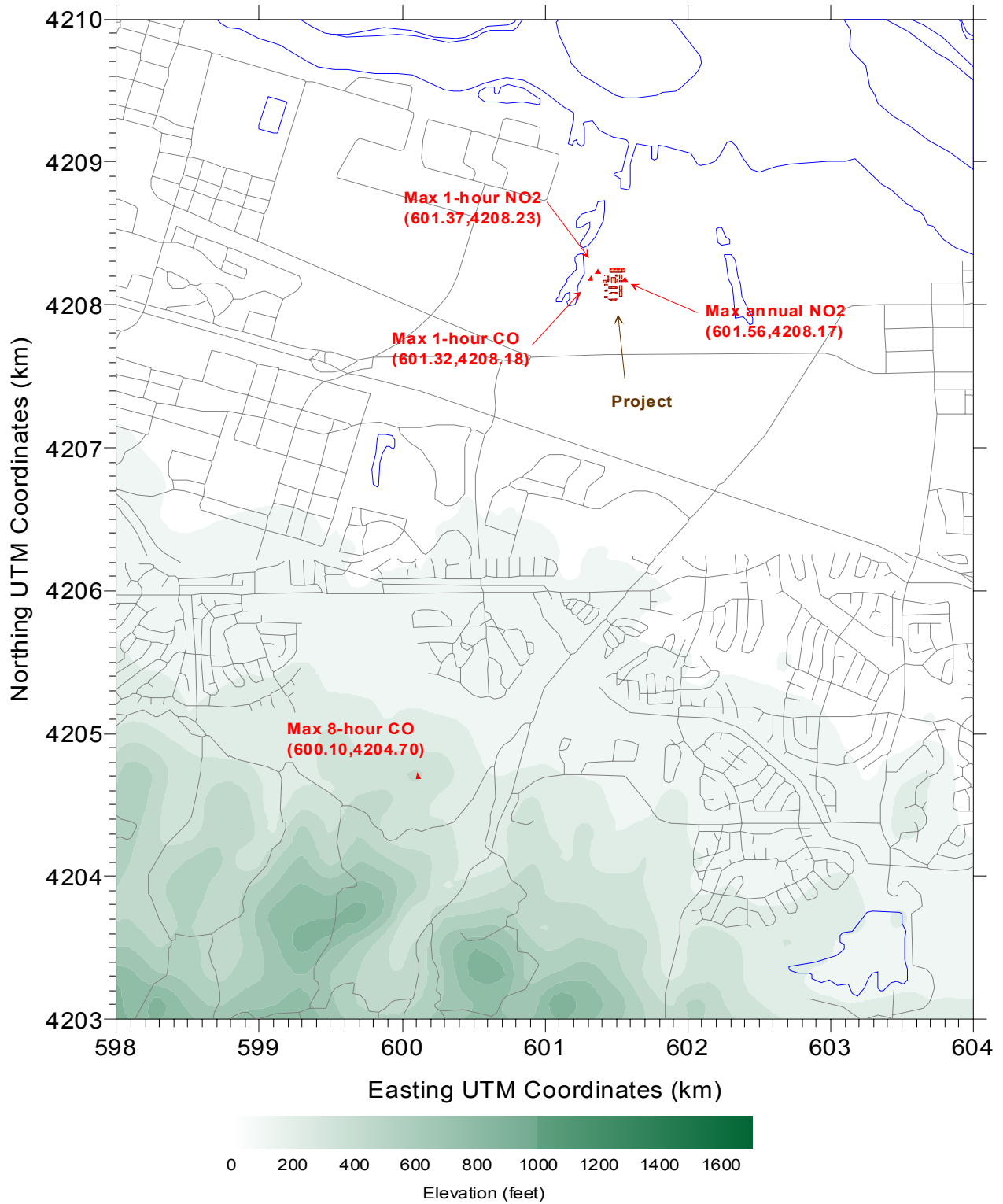


Figure 1. Location of project maximum impacts.

Table V contains the comparison of the ambient standards with the proposed project impacts added to the maximum background concentration. National and California ambient NO₂ and CO standards are not exceeded from the proposed project.

TABLE V
 California and national ambient air quality standards and
 ambient air quality levels from the proposed project (µg/m³)

Pollutant	Averaging Time	Maximum Background	Maximum Project impact	Maximum Project impact plus maximum background	California Standards	National Standards
NO ₂	1-hour	164	185	349	470	---
CO	1-hour	7,130	5,085	12,215	23,000	40,000
CO	8-hour	4,375	633	5,008	10,000	10,000

CLASS I PSD INCREMENT ANALYSIS

EPA requires an increment analysis of any PSD source if it increases NO₂ or PM₁₀ concentrations by 1 µg/m³ or more (24-hour average) and if it is within 100 km of a Class I area. Pt. Reyes National Seashore is located 77 km to the west of the project, and is the only Class I area within 100 km of the facility. A screening analysis showed that the maximum 24-hour NO_x is 0.43 µg/m³ and the maximum 24-hour PM₁₀ is 0.20 µg/m³ within the Class I area. Therefore a Class I PSD increment consumption analysis is not required.

VISIBILITY, SOILS AND VEGETATION IMPACT ANALYSIS

Visibility impacts were assessed using EPA's VISCREEN (version 88341) visibility screening model. The analysis shows that the proposed project will not cause any impairment of visibility at Point Reyes, the nearest Class I area.

The project maximum one-hour average NO₂, including background, is 349 µg/m³(Table V). This concentration is below the California one-hour average NO₂ standard of 470 µg/m³. Crop damage from NO₂ requires exposure to concentrations higher than 470 µg/m³ for periods longer than one hour.

Maximum project NO₂ and CO concentrations would be less than all of the applicable State and national primary and secondary ambient air quality standards, which are designed to protect the public welfare from any known or anticipated effects, including plant damage. Therefore, the facility's impact on soils and vegetation would be insignificant.

CONCLUSIONS

The results of the air quality impact analysis indicate that the proposed project would not interfere with the attainment or maintenance of applicable AAQS for NO₂ and CO. This analysis was based on EPA approved models and calculation procedures and was performed in accordance with Section 414 of the District's NSR Rule.