CH2M HILL
2485 Natomas Park Drive
Suite 600
Sacramento, CA 95833

CH2MHILL

October 12, 2004
184288

DOCKET
04-AFC-1
DATE OCT 12 2004
RECD. OCT 13 2004

Mr. William Pfanner
Siting Project Manager
California Energy Commission
1516 Ninth Street, MS-15
Sacramento, CA 95814-5504

RE: Data Response, Set 2A
San Francisco Electric Reliability Project (04-AFC-1)

Dear Bill:

On behalf of the City of San Francisco, please find attached 12 copies and one original of the Data Responses, Set 2A, in response to Staff's Data Requests dated September 10, 2004. We are filing copies of this Data Response both electronically and in hard copy.

Please call me if you have any questions.

Sincerely,

CH2M HILL
John L. Carrier, J.D.
Program Manager

c: Project File
Proof of Service List

SAN FRANCISCO ELECTRIC RELIABILITY PROJECT (04-AFC-1)

DATA RESPONSE, SET 2A

(Responses to Data Requests: 157-159)

Submitted by

CITY AND COUNTY OF SAN FRANCISCO

October 12, 2004

CH2MHILL

2485 Natomas Park Drive, Suite 600
Sacramento, California 95833-2937

SAN FRANCISCO ELECTRIC RELIABILITY PROJECT
(04-AFC-1)
DATA RESPONSES, SET 2A

Technical Area: Biological Resources
Author: Rick York
SFERP Authors: Sierra Research and John Cleckler

BACKGROUND

Staff and the U. S. Fish and Wildlife Service (USFWS) are concerned about potential impacts from the project's nitrogen oxide compounds (NO_x) and ammonia (NH_3) emissions onto San Bruno Mountain located approximately 4.5 miles southwest of the project site. Nitrogen deposited on nitrogen-poor soils can act as a fertilizer stimulating the growth of non-native plants, which could cause significant adverse impacts to federal protected butterfly species. The AFC does not provide an analysis of existing conditions and the potential for increased nitrogen deposition on San Bruno Mountain. Staff needs the analysis to determine if impacts are likely and suitable mitigation, if necessary.

DATA REQUEST

157. Please provide a modeling analysis of the ambient nitrogen deposition rate and the addition that the SFERP project would contribute on San Bruno Mountain.

Response: The existing background nitrogen (N) deposition rate at San Bruno Mountain is estimated to be 6.41 kg N/ha/year (see Attachment BR-157A for derivation of existing background rate). The average modeled nitrogen deposition from the project over the area is estimated to be 0.0058 kg/ha/year, or less than 0.001 percent of background. The modeling methodology is described in detail in Attachment BR-157B. The total deposition is thus 6.41 plus 0.0058, or 6.42 kg/ha/year.

Modeling input and output files are being provided to the Commission under separate cover.

This modeling analysis does not take into account the oxides of nitrogen (NOx) emission reduction credits (ERC) being provided for the project, which will offset much of the nitrogen emissions increase from SFERP. The Applicant will provide 47.5 tons per year of NOx ERCs, which will result in a 14.5 ton per year reduction in nitrogen emissions (see Table BR-158). This represents 33 percent of the 44.4 tons per year of nitrogen from the new facility.

In addition, this modeling analysis does not consider NOx emission reductions from the closure of existing in-City generation. The City is pursuing the SFERP in order to support closure of existing generation in San Francisco while maintaining reliability. The project should ensure closure of the Hunters Point Power Plant if there is a delay in the construction of the Jefferson-Martin transmission line. In addition, the California Independent System Operator (ISO) recently confirmed that once the Jefferson-Martin line and eight transmission projects that are currently in service or under development are in service, the SFERP, along with another City sponsored generation project at the San Francisco Airport, will also provide for closure of Potrero Units 4, 5 and 6 when the City generation projects are placed in service. The ISO also indicated that with the

addition of four transmission projects, the City generation projects will provide for closure of Potrero Unit 3 in 2007. See the September 10, 2004, Memorandum from Marcie Edwards to the ISO Board of Governors ()Attachment BR-157C). Finally, the ISO governing board has directed ISO staff to study whether the City generation projects could provide for closure of Potrero 3 upon completion. The potential reductions in nitrogen emissions associated with these shutdowns are discussed further in Data Response #158.

158. Please provide an analysis of cumulative nitrogen deposition impacts of the new project in combination with existing, background deposition rates. Please discuss various cumulative impact scenarios that both include and exclude the Hunters Point Power Plant and Potrero facilities.

Response: The requested analysis of cumulative nitrogen deposition impacts of the new project in combination with existing background deposition levels is provided in Data Response #157.

Current nitrogen deposition impacts on San Bruno Mountain reflect the impacts of operation of the Hunters Point and Potrero power plants. Therefore, historical operation of those power plants provides a baseline for the assessment of potential future cumulative impacts.

Three potential future operating scenarios were evaluated. In the first scenario, it was assumed that both Potrero and Hunters Point power plants would continue to operate at historical levels (that is, future annual heat input to each unit would be equal to the average annual heat input over the past 3 years), that the boilers at each plant would meet the 2006 NOx regulatory limit of 0.018 lb/MMBtu contained in the Bay Area Air Quality Management District's (BAAQMD) Rules and Regulations using selective catalytic reduction (SCR) systems with 10 ppm ammonia slip to reduce NOx emissions on the steam boiler units at Potrero and Hunters Point power plants, and that no additional controls would be installed on the peaking turbines. In the second scenario, it was assumed that the Potrero power plant would continue to operate at historical levels, with Unit 3's NOx emissions controlled using SCR to meet the BAAQMD's regulatory NOx limit (0.018 lb NOx/MMBtu effective 1/1/06) with 10 ppm ammonia slip (corrected to 3% O_2), and that the Hunters Point power plant would be shut down. In the third scenario, it was assumed that both the Potrero and Hunters Point power plants would be shut down. All scenarios include the NOx reductions from the offsets to be provided for SFERP.

Calculations for each scenario are shown in Table BR-158. These calculations show that even with SFERP and continued operation of the Hunters Point and Potrero power plants with the required SCR control in place, there will be a net reduction of over 52 tons per year of nitrogen emissions in southeast San Francisco. Even with the addition of SFERP and the continued operation of the Potrero power plant, the shutdown of Hunters Point will result in a net reduction in nitrogen emissions of approximately 86 tons per year. If both the Potrero and Hunters Point power plants are shut down, the area will see a net reduction in nitrogen emissions of about 169 tons per year.

TABLE BR-158
Nitrogen Emissions: Cumulative Impacts

Scenario 1: Continued Operation of Potrero and Hunters Point at Historical Levels with SCR on Boilers

Source	Emissions, tons per year				
	NOx	N from NOx	NH3	N from NH3	Total N
SFERP: Project Emissions	39.8	12.1	39.2	32.3	44.4
SFERP: NOx Offsets	-47.5	-14.5	--	--	-14.5
Hunters Point: Emission Reductions due to the Installation of NOx SCR Controls Based on Continued Historical Operation (1)	-104.2	-31.7	8.6	7.1	-24.6
Mirant Potrero: Emission Reductions due to the Installation of NOx SCR Controls Based on Continued Historical Operation (1)	-235.7	-71.7	16.8	13.8	-57.9
Total					**-52.5**

Scenario 2: Shutdown of Hunters Point, Continued Operation of Potrero at Historical Levels with SCR on Boiler 3

Source	Emissions, tons per year				
	NOx	N from NOx	NH3	N from NH3	Total N
SFERP: Project Emissions	39.8	12.1	39.2	32.3	44.4
SFERP: NOx Offsets	-47.5	-14.5	--	--	-14.5
Hunters Point: Emission Reductions due to the Complete Plant Shutdown (2)	-190.1	-57.9	--	--	-57.9
Mirant Potrero: Emission Reductions due to the Installation of NOx SCR Controls Based on Continued Historical Operation (1)	-235.7	-71.7	16.8	13.8	-57.9
Total					**-85.8**

Scenario 3: Shutdown of Hunters Point and Potrero

Source	Emissions, tons per year				
	NOx	N from NOx	NH3	N from NH3	Total N
SFERP: Project Emissions	39.8	12.1	39.2	32.3	44.4
SFERP: NOx Offsets	-47.5	-14.5	--	--	-14.5
Hunters Point: Emission Reductions due to the Complete Plant Shutdown (2)	-190.1	-57.9	--	--	-57.9
Mirant Potrero: Emission Reductions due to the Complete Plant Shutdown (2)	-464.5	-141.4	--	--	-141.4
Total					**-169.3**

Notes:
1. Based on average emissions and fuel use during 2001-2003, with boilers controlled to 0.018 lb NOx/MMBtu using SCR with ammonia slip rate of 10 ppm @ 3% O_2 and no additional controls on peaking turbines.
2. Based on average emissions and fuel use during 2001-2003.

159. Please provide an analysis of the potential impacts of any increased nitrogen deposition on serpentine grasslands and other habitats on San Bruno Mountain and the East Bay and identify any mitigation measures to reduce those impacts.

Response: The habitats and special-status species of San Bruno Mountain are managed under the San Bruno Mountain Habitat Conservation Plan (HCP). Of chief concern are three special-status butterfly species: the mission blue butterfly, (*Plebejus icarioides missionensis*), San Bruno elfin butterfly (*Incisalia mossi bayensis*), and the callippe silverspot butterfly (*Speyeria callippe callippe*). The mission blue butterfly and the San Bruno elfin butterfly are federal-listed as endangered. The callippe silverspot butterfly is federal-listed as threatened. San Bruno Mountain is designated critical habitat for the Bay checkerspot butterfly (*Euphydryas editha bayensis*); however, the population is now considered extinct.

All three species depend on nectar from a variety of sources but require specific larval host plants. Mission blue butterfly larvae feed exclusively on lupine species (*Lupinus albifrons, Lupinus variicolor,* and *Lupinus formusus*), which grow in open grassland habitat, rocky slopes, and disturbed areas. California golden violet (*Viola pedunculata*) is the host plant of the callippe silverspot butterfly and is found in a variety of habitats including open grasslands and chaparral. The host plant for the San Bruno elfin butterfly is the pacific stone crop (*Sedum spathufolium*), which is typically found around rocky outcrops. All three butterfly species have been listed primarily due to habitat loss; however, their host plants are not considered rare.

The primary threat to the three butterfly species at San Bruno Mountain is habitat loss due to the encroachment of non-native species and the expansion of coastal scrub vegetation (pers. comm. with Patrick Kobernus, HCP administrator). The associated larval host plants are not associated with serpentine soils and there is a lack of specific data suggesting that nitrogen deposition is a contributing factor to invasive plant growth in San Bruno Mountain butterfly habitat.

San Bruno Mountain is characterized by a variety of habitats including grassland, woodland, chaparral, coastal scrub, and wetland vegetation communities. The majority of the 10 rare plant species identified on San Bruno Mountain are associated with chaparral and coastal scrub communities. Coast rock cress (*Arabis blepharophylla*) and San Franciscan wallflower (*Erysimum franciscanum*) are the only identified special-status plant species associated with serpentine soils. Both species are also associated with other habitats found on San Bruno Mountain and are not exclusive to serpentine conditions.

Nitrogen deposited on the ground must be converted to plant-available forms of nitrogen to affect plant nutrition. Absorption of NO_3 and NH_3 by plant roots is the predominate mode of plant nitrogen nutrition, but a relatively small amount of NH_3 and NO_3[1]. Nitrogen fertilization of nutrient-poor soils increases nitrogen absorption by plant roots and, consequently, increases the growth rate and biomass production of many species, including the non-native annual grass species that tend to invade native California grasslands. Endemic serpentine vegetation is particularly sensitive to competition from fast growing annual grasses. Serpentine soil communities are

[1] Marschner, H. 1995. Mineral Nutrition of Higher Plants. Academic Press, New York, NY.

relatively nutrient poor and are particularly vulnerable to nitrogen deposition in the Bay Area. Although most vegetation communities are sensitive to competition from invasive non-native plants, especially grasses, the following analysis will focus on serpentine grasslands as the worst case scenario.

When soils are fertilized by artificial nitrogen sources, those nitrogen sources are available to all plant species. However, non-native grasses usually have more vigorous growth habitats than serpentine species. The threshold of annual nitrogen deposition rates that can potentially influence ecosystem change to serpentine plant communities is approximately 5 to 6 kg/ha/year[2]. Increased fertilization and subsequent succession of endemic serpentine species to non-native grasses currently occurs in grassland habitats throughout the Bay Area. Cattle grazing has become an important management tool for control of non-native grasses, which increases the survival potential of endemic serpentine plant species and endemic invertebrate species such as the Bay checkerspot butterfly.

Background nitrogen deposition rates at San Bruno Mountain are estimated to be approximately 6.41 kg/ha/year. According to nitrogen deposition modeling results, SFERP operation would result in an additional annual average of 0.0058 kg/ha/year on San Bruno Mountain. This amounts to a 0.0009 percent increase from ambient levels for a total of approximately 6.42 kg N/ha/year. This estimate indicates that current deposition rates already fall within the 5 to 6 kg N/ha/year expected to affect a change in serpentine vegetation. The potential for deposition from SFERP operation to initiate further transformation of vegetation communities on San Bruno Mountain and East Bay is extremely low. Impacts from nitrogen deposition on serpentine communities at San Bruno Mountain most likely already exist, and any potential incremental increase from SFERP operation would be considered cumulative, although very slight. (This analysis assumes continued operation of the Hunters Point and the Potrero power plants.)

The level of nitrogen deposition from the SFERP would actually be less than the calculated amount because the deposition will be distributed in small amounts during the year and not all of the nitrogen added to the soil during each deposition event is available for plant use due to losses associated with soil processes.

Proposed Mitigation

San Bruno Mountain is already within the threshold limits of 5 to 6 kg N/ha/year; therefore, any incremental increase could constitute a degree of cumulative impact. Mitigation measures to reduce potential adverse impacts from SFERP may include one, or both, of the following:

- Surrendering Emission Reduction Credits for increases in oxides of nitrogen emissions.
- Permanent closure of Hunter's Point power plant

The surrendering of ERCs will reduce the overall nitrogen emissions in the greater Bay Area due to the regulatory approach employed in BAAQMD's ERC program. When a

[2] 2003 Metcalf Energy Center Ecological Preserve Annual Monitoring Report

facility such as SFERP is required to acquire ERCs for a project, it must secure and surrender a greater number of ERCs than the emissions of the pollutant. This is commonly defined as the offset ratio. The oxides of nitrogen emissions offset ratio in the BAAQMD is 1.15 to 1, which means that for every pound of oxides of nitrogen expected to be emitted from SFERP, 1.15 pounds of nitrogen ERCs will be secured and surrendered.

The permanent closure of Hunters Point will reduce nitrogen emissions in the southeast San Francisco area by 57.9 tons per year, which when combined with the ERCs that will be surrendered for the SFERP project, results in a nitrogen offset ratio of 1.6 to 1 (14.5 TPY of nitrogen offsets for SFERP plus 57.9 TPY reduction in nitrogen from the Hunters Point closure divided by 44.4 TPY of SFERP nitrogen emissions). This reduction in the nitrogen emissions has the potential of reducing the nitrogen deposition on the San Bruno Mountain sensitive habitat areas.

SAN FRANCISCO ELECTRIC RELIABILITY PROJECT
(04-AFC-1)
DATA RESPONSES, SET 2A

Attachment BR-157A
Calculation of Nitrogen Deposition Baseline for San Bruno Mountain

General Methodology

The general methodology used in estimating the nitrogen deposition baseline is that relied upon by Dr. Stuart Weiss[3]. This method starts with deposition measurements reported by Blanchard, et al[4], and makes adjustments for location and surface composition. In the current analysis, we make further adjustments to reflect reductions in ambient pollutant concentrations over the 10 to 15-year period since the data collection effort reflected in Blanchard's work.

The starting values for deposition are taken from Table 12 of Blanchard's report, and represent long-term average deposition rates, on a quarterly basis, for various species in Fremont, California.[5] These values are adjusted from their ionic bases to a nitrogen basis, and then are further adjusted for surface composition; location change; and recent pollution reduction efforts. Each of these adjustments is further discussed below.

Surface Composition

In his paper, Weiss notes that deposition rates vary as a function of surface composition. The data collected by Blanchard at Fremont represented an "urban mix" of surfaces, while the areas of interest related to San Bruno Mountain are principally green grasslands during the fall and winter months. To address this type of difference, Weiss applied correction factors, obtained from Blanchard, to reflect different deposition rates during fall and winter months. Weiss provided similar correction factors for use in the analysis that was prepared in 2000 for grassland areas in the San Jose area. These same factors were applied, on a species-specific basis, to the first and fourth calendar quarter deposition rates, for this analysis.

Location Differences

Weiss further adjusted the deposition rates measured in Fremont to reflect differing levels of ozone and nitrogen dioxide in the San Jose area. In particular, a factor of 1.3 was applied to deposition of NO2 and NO3 to reflect higher concentrations of nitrogen dioxide in San Jose as compared with Fremont. Similarly, a factor of 1.2 was applied to HNO3 deposition to reflect higher concentrations of ozone in San Martin (south of San Jose) as compared with Fremont. For the current analysis, we looked at ozone and nitrogen dioxide data from Fremont and San Francisco. The data used to develop the correction factors are shown in Table 157A-1. The

---

[3] Weiss, S. 1999. Cars, Cows and Checkerspot Butterflies: Nitrogen Deposition and Management of Nutrient-Poor Grasslands for a Threatened Species. Conservation Biology **13**: 1476-1486

[4] Blanchard, C., Michaels, H., and Tanenbaum, S. Regional Estimates of Acid Deposition Fluxes in California for 1985-1994. Contract number 93-332. Sacramento, CA: California Air Resources Board, April 1996.

[5] Deposition data from Fremont, CA, were used in this analysis because these Fremont is the nearest available dry deposition monitoring station to the project site. Fremont and San Francisco are located in the same air basin (meaning the two locations share common air quality characteristics) and Fremont data were determined to be the most representative data available. Other monitoring sites are located in the Sacramento and San Joaquin valleys and southern California, farther from the project site and outside of the air basin.

revised analysis resulted in factors of 1.018 for nitrogen dioxide, and 0.623 for ozone (reflecting lower concentrations of ozone in San Francisco than in Fremont).

Recent Emission Reductions

To further refine the estimate, we added an additional correction factor that reflected the air quality improvements that have been observed in the Bay Area over the last 10 years. The original deposition measurements covered the period between 1988 and 1993 at Fremont. For that period of time, the California Air Resources Board reported three relevant statistics for ozone (top four 8-hour average ozone levels; annual average ozone level; and annual average of daily maximum ozone level), and one relevant statistic for nitrogen dioxide (annual average). Each of these values is shown in Table 157A-1 for each year between 1988 and 1993, along with the average for the 6-year period.

For the most recent three years for which data are available (2001-2003), the only relevant ozone statistic available is the top four 8-hour average ozone levels. Consequently, we used the average of the top four 8-hour average ozone levels as a measure of the relative change in ozone concentrations between the two time periods (1988-93 vs. 2001-03). This metric is a good indicator of the relative severity of the ozone season and, by using multi-year averages, is a good indicator of the change in emissions loading in the region independent of year-to-year fluctuations in ambient concentrations due to meteorology.

Using this metric, we conclude that ozone levels in 2001-03 are 0 to 10 percent lower than the levels observed in 1998-93 when the deposition data were collected. Similarly, looking at the change in annual average NO2 concentrations, we conclude that levels of this pollutant have been reduced 22 percent since the earlier period. Consequently, we applied a final adjustment factor of 0.95 for ozone and 0.78 for nitrogen dioxide. Consistent with Weiss' methodology, the ozone adjustment was applied to HNO3, and the NO2 adjustment was applied to NO2 and NO3.

In conclusion, we believe that the current best estimate of nitrogen deposition in the vicinity of San Bruno Mountain is 6.4 kg/ha/yr N. This estimate is probably conservatively high, based on Weiss's statement that "[p]eninsula sites have lower deposition, 4-6 kg N/ha/year."6 The results of our analysis, including all adjustment factors, are presented in Table 157A-2.

[6] Weiss, 1476.

SAN FRANCISCO ELECTRIC RELIABILITY PROJECT
(04-AFC-1)
DATA RESPONSES, SET 2A

TABLE 157A-1
Nitrogen Deposition Analysis - Related Air Quality Data

	Fremont – Chapel				San Francisco - Arkansas St				Ratio - San Francisco:Fremont			
Year	Avg of Top 4 8-hr Avg O_3 (ppm)	Ann Avg O_3 (ppm)	Ann Avg Daily Max O_3 (ppm)	Ann Avg NO_2 (ppm)	Avg of Top 4 8-hr Avg O_3 (ppm)	Ann Avg O_3 (ppm)	Ann Avg Daily Max O_3 (ppm)	Ann Avg NO_2 (ppm)	Avg of Top 4 8-hr Avg O_3 (ppm)	Ann Avg O_3	Ann Avg Daily Max O_3	Ann Avg NO_2
1988	0.086	0.019	0.043	0.026	0.060			0.026	0.692	0.000	0.000	1.000
1989	0.081	0.018	0.041	0.025	0.053			0.026	0.657	0.000	0.000	1.040
1990	0.073	0.017	0.039	0.023	0.050			0.021	0.682	0.000	0.000	0.913
1991	0.074	0.019	0.040	0.024	0.044			0.024	0.598	0.000	0.000	1.000
1992	0.074	0.017	0.039	0.021	0.047			0.022	0.639	0.000	0.000	1.048
1993	0.091	0.020	0.043	0.022	0.045			0.024	0.489	0.000	0.000	1.091
Average	0.080	0.018	0.041	0.024	0.050			0.024	0.623	0.000	0.000	1.014
2001	0.072			0.019	0.050			0.019				
2002	0.066			0.019	0.046			0.019				
2003	0.077			0.017	0.054			0.018				
Average	0.072			0.018	0.050			0.019	0.702			1.018
Change: 2001-03 vs 1988-93	**-10%**			**-22%**	**1%**			**-22%**				

TABLE 157A-2
Nitrogen Deposition - Baseline Calculation

	Gas-Phase Species			Particulate		Total	
	HNO3	NO2	NH3	NO3	NH4	(kg/ha/year)	Comments
1st Calendar Quarter							
Fremont Data (88-94)	3.220	9.010	1.110	0.740	0.160	14.240	from Blanchard, Table 12)
Fremont Data (88-94)	0.716	2.742	0.914	0.167	0.124	4.663	kg/ha/year (as N)
Grassland Adjustment	1.058	1.805	3.189	2.364	3.187		ratio
Adjusted Fremont Data (88-94)	0.757	4.949	2.915	0.395	0.397	9.413	kg/ha/year (as N)
Fremont -> SFERP Adjustments							
for ozone	0.623						ratio
for NO_2		1.014		1.014			ratio
Adjusted SFERP (88-94)	0.472	5.018	2.915	0.400	0.397	9.202	kg/ha/year (as N)
Current Year Adjustment (88-94 to 01-03)							
for ozone	0.955						ratio
for NO_2		0.780		0.780			ratio
Adjusted SFERP Baseline (01-03)	0.450	3.914	2.915	0.312	0.397	7.989	kg/ha/year (as N)
2nd Calendar Quarter							
Fremont Data (88-94)	5.940	7.790	1.010	0.730	0.100	15.570	from Blanchard, Table 12)
Fremont Data (88-94)	1.320	2.371	0.832	0.165	0.078	4.765	kg/ha/year (as N)
Grassland Adjustment	1.000	1.000	1.000	1.000	1.000		ratio
Adjusted Fremont Data (88-94)	1.320	2.371	0.832	0.165	0.078	4.765	kg/ha/year (as N)
Fremont -> SFERP Adjustments							
for ozone	0.623						ratio
for NO_2		0.780		0.780			ratio
Adjusted SFERP (88-94)	0.822	1.849	0.832	0.129	0.078	3.710	kg/ha/year (as N)
Current Year Adjustment (88-94 to 01-03)							
for ozone	0.955						ratio
for NO_2		0.780		0.780			ratio
Adjusted SFERP Baseline (01-03)	0.785	1.442	0.832	0.100	0.078	3.238	kg/ha/year (as N)

TABLE 157A-2
Nitrogen Deposition - Baseline Calculation

	Gas-Phase Species			Particulate		Total	
	HNO3	NO2	NH3	NO3	NH4	(kg/ha/year)	Comments
3rd Calendar Quarter							
Fremont Data (88-94)	10.770	9.290	1.200	0.860	0.170	22.290	from Blanchard, Table 12)
Fremont Data (88-94)	2.393	2.827	0.988	0.194	0.132	6.535	kg/ha/year (as N)
Grassland Adjustment	1.000	1.000	1.000	1.000	1.000		ratio
Adjusted Fremont Data (88-94)	2.393	2.827	0.988	0.194	0.132	6.535	kg/ha/year (as N)
Fremont -> SFERP Adjustments							
for ozone	0.623						ratio
for NO_2		1.014		1.014			ratio
Adjusted SFERP (88-94)	1.491	2.867	0.988	0.197	0.132	5.675	kg/ha/year (as N)
Current Year Adjustment (88-94 to 01-03)							
for ozone	0.955						ratio
for NO_2		0.780		0.780			ratio
Adjusted SFERP Baseline (01-03)	1.424	2.236	0.988	0.154	0.132	4.934	kg/ha/year (as N)
4th Calendar Quarter							
Fremont Data (88-94)	2.820	11.600	1.110	1.350	0.230	17.110	from Blanchard, Table 12)
Fremont Data (88-94)	0.627	3.530	0.914	0.305	0.179	5.555	kg/ha/year (as N)
Grassland Adjustment	1.058	1.805	3.189	2.364	3.187		ratio
Adjusted Fremont Data (88-94)	0.663	6.371	2.915	0.721	0.570	11.240	kg/ha/year (as N)
Fremont -> SFERP Adjustments							
for ozone	0.623						ratio
for NO_2		1.014		1.014			ratio
Adjusted SFERP (88-94)	0.413	6.460	2.915	0.731	0.570	11.090	kg/ha/year (as N)
Current Year Adjustment (88-94 to 01-03)							
for ozone	0.955						ratio
for NO_2		0.780		0.780			ratio
Adjusted SFERP Baseline (01-03)	0.394	5.039	2.915	0.570	0.570	9.489	kg/ha/year (as N)
Annual Average							
Adjusted SFERP Baseline (01-03)						6.412	kg/ha/year (as N)

Attachment BR-157B
Nitrogen Deposition Modeling Methodology

Overview of Modeling Procedure

The SFERP modeling analysis used the Industrial Source Complex Short Term, Version 3 (ISCST3) model, to evaluate the project's air quality impacts. ISCST3 is a steady-state, mass-conserving, nonreactive (i.e., no chemistry) Gaussian plume dispersion model.

All three turbines were modeled. These are the only sources at the facility with emissions of nitrogen-containing compounds. The calculation of nitrogen emissions for use in this modeling analysis are shown in Table 157B-1.

TABLE 157B-1
Nitrogen Deposition Emission Rates

NOx emission rate = 13.27 tpy per turbine	
N/NO_2 molecular weight ratio (14/46) = 0.304347826	
N emission rate from NO_2 =	4.04 tpy per turbine 0.1162 g/s per turbine
N emission rate for modeling contribution from NO_2 = 0.0197 g/s per turbine	
NH_3 emission rate = 13.08 tpy per turbine	
N/NH_3 molecular weight ratio (14/17) = 0.823529412	
N emission rate from NH_3 = 10.77 tpy per turbine	
N emission rate for modeling contribution from NH_3 = 0.3099 g/s per turbine	

Notes:
Emission rates based on annual average values
Use 17% conversion rate for N from NO_2 only

To produce conservative results (overestimates), conservative assumptions regarding the complex chemistry that occurs to produce nitrogen from NOx and ammonia were used. These assumptions lead to an exceedingly conservative estimation of nitrogen deposition, because areas with the highest nitrogen emissions do not necessarily experience the greatest deposition effects, which usually occur far from the original nitrogen source. In addition, since mass is conserved in the model, all downwind calculations of nitrogen deposition, regardless of distance and formation rates, are overestimated by the model.

The ISCST3 model calculates atmospheric deposition of nitrogen by calculating the wet and dry fluxes of total nitrogen. This deposition is accomplished by using a resistance model for the dry deposition part, and by assigning scavenging coefficients for the wet removal process from rainout. As discussed below, depositional parameters are input into the model to calculate the deposition of nitrogen.

Chemical Transformation of NO_x Emissions

The oxidation of nitrogen oxides is a complicated process that can include a large variety of nitrogen species, such as nitrogen dioxide (NO2), nitric acid (HNO3) and organic nitrates (RNO3) such as peroxyacetylnitrate (PAN). Atmospheric chemical reactions that occur in sunlight result in the formation of ozone and other compounds. Depending on atmospheric conditions, these reactions can start to occur within several hundred meters of the original NOx source, or after the pollutants have been carried tens of kilometers downwind. Ultimately, some nitrogen oxides are converted to nitric acid vapor or particulate nitrates. Precipitation is one mechanism that removes these pollutants from the air. Forms of atmospherically-derived nitrogen are removed from the atmosphere both by wet deposition (rain) and dry deposition (direct uptake by vegetation and surfaces).

Ammonia (NH3) and ammonium (NH4) are other forms in which nitrogen occurs. Ammonia is a gas that becomes ammonium when dissolved in water, or when present in soils or airborne particles. Unlike NOx, which forms during combustion, soil microorganisms naturally form ammonia and ammonium compounds from nitrogen and hydrogen.

In urban atmospheres, the oxidation rate of NOx to HNO3 is estimated to be approximately 17 percent per hour, with a range of 10 to 30 percent per hour (CARB, 1986). Aerosol nitrates (NO3) are present, mainly in the form of ammonium nitrate (NH4NO3). Nitrate and ammonium are the predominant forms by which plants absorb nitrogen. In California, ammonium nitrate is the predominant airborne nitrate-bearing particle in the atmosphere (CARB, 1986). The SFERP analysis used the CARB estimate of 17 percent immediate conversion of NOx to HNO3.

Nitrogen Deposition Mechanisms

The ISCST3 wet and dry deposition modeling for gaseous pollutants is based on the algorithm contained in the CALPUFF dispersion model (USEPA, 1995), which Moore, et al., reviewed and evaluated (1995). The deposition flux, Fd, is calculated as the product of the concentration, Πd, and a deposition velocity, vd, computed at a reference height zd:

$$F_d = \chi_d \bullet v_d$$

The dry deposition algorithm is based on an approach that expresses the deposition velocity as the inverse sum of total resistance. The resistance represents the opposition to transporting the pollutant through the atmosphere to the surface. ISCST3 incorporates several resistance models that include aerodynamic resistance, canopy resistance, cuticle resistance, deposition layer resistance, mesophyll resistance, and stomatal action.

With wet deposition, gaseous pollutants are scavenged by dissolution into cloud droplets and precipitation. A scavenging ratio approach was used to model the deposition of gases through wet removal. In this approach, the flux of material to the surface through wet deposition (Fw) is the product of a scavenging ratio times the concentration, integrated in the vertical direction.

Model Inputs

To model gaseous deposition, the following inputs are required:

- The molecular diffusivity for the pollutant being modeled [cubic centimeters per second (cm2/s)]
- The solubility enhancement factor (a*) for the pollutant
- The pollutant reactivity parameter
- The mesophyll resistance term (rm) for the pollutant (s/cm),
- The Henry's Law coefficient for the parameter

In addition to the above inputs, the dry and wet deposition algorithm also requires surface roughness length (cm), friction velocity (meters per second), Monin-Obukhov length (meters), leaf index ratio, precipitation type, and precipitation rate. Site-specific meteorology was used in this analysis and was based on the 1992 data set collected at the adjacent Potrero Power Plant. Hourly cloud cover, relative humidity and solar radiation data, which were required for the modeling analysis but were not available from the Potrero meteorological data set, were taken from San Francisco Airport (cloud cover and RH) and the nearest CIMIS station (solar radiation) in Fremont.

ISCST3 calculates depositional flux at user-specified locations, called receptors. Receptors were placed at 100-meter intervals throughout the park on along the park boundaries, producing more than 1100 locations where deposition was calculated in the model.

The impact over the critical area was determined using the average deposition rate over the area. Impacts were modeled over the entire area of San Bruno Mountain.

CALIFORNIA ISO

California Independent System Operator

Memorandum

To: ISO Board of Governors

From: Marcie Edwards, Interim CEO

cc: ISO Officers; Board Assistants

Date: September 10, 2004

Re: Action Plan for San Francisco, Options and Risks

This memorandum does not require Board action.

Purpose of Memo

This is in response to questions about the electric infrastructure of San Francisco that came up at the Board of Governor's July 29, 2004 meeting. This memo provides analysis and recommendations as to:

- The Action Plan for release of PG&E owned generation at Hunters Point and Mirant owned generation at Potrero from ISO Reliability Must Run (RMR) Agreements,
- An analysis of the retrofit of the Potrero 3 Power Plant with emissions control technology and how that impacts the Action Plan, and
- A discussion of the reliability of Hunters Point Unit 4 and the appropriateness of its designation as a RMR generation unit.

Action Plan to Release Hunters Point and Potrero from their RMR Agreements – An Action Plan acceptable to the ISO for release of the existing generation at Hunters Point and Potrero from RMR contracts involves successful completion of a total of 12 transmission projects by PG&E, four peaking power plants by the City, and the Mirant retrofit of Potrero 3 with emissions control technology for its temporary operation. The ISO does not control the dates of completion of these projects, nor does it control the permanent shutdown of the Hunters Point and Potrero generation.

The action plan acceptable to the ISO for the shut down of Hunters Point and Potrero units is based on assumptions that are subject to change. Such assumptions include current and expected status of transmission, generation, and customer demand. Any significant change to the assumptions underlying our analysis may change our conclusions. If such significant changes do occur, the ISO is obligated to review the continued acceptability of this action plan.

To release Hunters Point and Potrero Generation from their RMR Agreements requires the following:

- **Hunters Point 2 and 3**
  Completion of one transmission project – scheduled for completion by PG&E in December 2004. These units are recommended to be released from their RMR Agreements in September 2004 for the 2005 RMR Year.

- **Hunters Point 1 and 4**
  Completion of seven transmission projects and the retrofit of Potrero 3 – the final project (Jefferson – Martin) is scheduled for completion sometime between December 2005 and March 2006. Therefore, these units are planned to be recommended for release from the RMR Agreements in September 2005 for the 2006 RMR Year.
- **Potrero 4, 5, 6**
  Completion of Peaking Power Plants by City – the scheduled completion is December 2006. Therefore, these units are planned to be recommended for release from their RMR Agreements in September 2006 for the 2007 RMR Year.
- **Potrero 3**
  Completion of four transmission projects and assuming previous completion of the Peaking Power Plants referenced above – PG&E is currently evaluating the project completion dates, but believes they are likely to be scheduled for 2007. Were this to occur, the ISO would plan to recommend this unit for release from its RMR Agreement in September 2007 for the 2008 RMR year.

(See Attachment 1 for a list of the projects and Attachment 2 for a detailed discussion of the Action Plan.)

The Action Plan is based on compliance with regional and national requirements. Those standards also include the Greater Bay Area Generation Outage Standard adopted by the Board as a result of rolling blackouts initiated in the San Francisco Bay Area on June 14, 2000 to protect against the potential for voltage collapse.

Analysis of Retrofit of Potrero 3 with Emission Control Technology – The Action Plan for the release of all Hunters Point generation from RMR contracts assumes Potrero 3 is retrofitted with emission control technology. Potrero 3 would then operate cleaner until it can be released from its RMR contract, assuming all needed projects are completed. The retrofit, with an estimated cost in excess of $20 million (cost information provided by Mirant), is deemed necessary to ensure there is sufficient generation to serve customer load consistent with power system planning criteria. Further, the retrofit of Potrero 3 is viewed as a superior option when taking into consideration air quality and cost.

Timely completion of the retrofit is now in question - Potrero 3 is a 206 MW power plant. Without a retrofit, its air permit will limit its output to 140 MW provided its emissions are offset by cleaner emissions from other SCR retrofitted units owned by Mirant that are located within the NOx bubble. These units include Pittsburg Units 5 and 6 and Contra Costa Unit 7. Studies show that this "non-retrofit" option increases the costs to PG&E's ratepayers (an additional $30M per year) and increase NOx emissions (by up to 1,150%).

The Action Plan for release of Hunters Point currently includes the retrofit of Potrero 3. The "non-retrofit" alternative provides less of a cushion for continued reliable operation of the San Francisco grid and, as stated, will increase cost and emissions (See Attachment 3 and 4 for supporting discussion). Throughout these discussions, the ISO has communicated its position on the Potrero retrofit to all interested parties.

At the September 15, 2004 ISO Board of Governor's meeting, the Board will be asked to approve the slate of RMR units for the 2005 Year. As stated previously, staff is recommending that Hunters Point Units 1 & 4 continue as RMR units for the 2005 Year until the projects that support their removal from RMR status have

been completed. All units at Potrero are being recommended for RMR status for the 2005 Year as well, given that none of the projects to support their release have been completed.

In addition, note that in the 2005 RMR Board Action item, staff has recommended that Pittsburg 6 continue as RMR for the 2005 calendar year. This is to allow forward movement with the projects needed to ultimately release both Hunters Point and Potrero from RMR given the assumption that a retrofit of Potrero 3 might be delayed indefinitely. Understand that air quality limitations affecting Potrero 3 will cause the unit to be limited to 140 MW in 2005 and remote generators will be required to operate at their maximum in order to meet air quality limits. In order to keep the unit running under its new air quality limitations beyond 2005, Unit 3 will continue to be limited to 140 MW and remote generators will continue to be required to operate at their maximum in order to meet air quality limits. So, without the Potrero 3 retrofit, Option 2, (See Attachment 3) is the automatic default. Potrero generation, meaning the existing CT's and some portion of Unit 3 are needed in order to release Hunter's Point from their RMR agreements; a fact which the ISO has long made plain.

Reliance on Hunters Point Unit 4 to Maintain Reliability – This is in response to the Board inquiry into how the historical availability of a generating unit factors into the ISO RMR analysis.

The historical availability of a generating unit is not explicitly factored into the analysis. Instead, the RMR analysis assumes only one generating unit is out at any one time. So Hunters Point 4 is assumed available and operating when any other generating unit is not.

When there is a pool of generation that is available, we seek the selection of units that are the more reliable. However, all the generation in the City is needed, so we do not have the ability to be selective. Since 2000, the availability of Hunters Point 4 has been above 60% in all but one year.

ISO grid planning studies, RMR studies, and operational studies confirm that Hunters Point 1 & 4 and Potrero 3, 4, 5, and 6 are required in order for customers in SF and SF/Peninsula NOT to be subjected to possible blackouts in 2005 stemming from a violation of planning criteria. The ISO, therefore, will recommend the re-designation of Hunters Point 4 (as well as Hunters Point Unit 1 and the Potrero units) as 2005 RMR units.

Attachment 1

PG&E Transmission Projects, City Peaking Power Plants and Mirant Retrofit of Potrero 3 Necessary To Meet NERC/WECC/CAISO Planning Requirements,

Project		Estimated Completion Date/Status	Issue	Resolution of Issue
Release Hunters Point Units 2 & 3 From Their RMR Agreements				
1	Potrero Static VAR Compensator	December 2004, Under Construction	NERC/WECC/CAISO Planning Standards	This project allows ISO/PG&E to meet planning requirements with Hunters Point Power Plant Units 2 and 3 released from their RMR Agreement
Release Hunters Point Units 1 & 4 From Their RMR Agreements				
2	San Mateo-Martin No. 4 Line Voltage Conversion	Completed	NERC/WECC/CAISO Planning Standards	This project in combination with the other listed projects allows ISO/PG&E to meet planning requirements with Hunters Point Power Plant Units 1 and 4 released from their RMR Agreement
3	Ravenswood 2nd 230/115 kV Transformer Project	Completed	NERC/WECC/CAISO Planning Standards	This project in combination with the other listed projects allows ISO/PG&E to meet planning requirements with Hunters Point Power Plant Units 1 and 4 released from their RMR Agreement
4	San Francisco Internal Cable Higher Emergency Ratings	Completed: To Be Used Upon Completion of the Jefferson-Martin 230kV Project	NERC/WECC/CAISO Planning Standards	These ratings are an interim solution that in combination with the other listed projects allows PG&E to meet planning requirements with Hunters Point Power Plant Units 1 and 4 released from their RMR Agreements. In 2007, a third Martin-Hunters Point 115 kV cable will replace the emergency ratings.
5	Tesla-Newark No. 2 230 kV Line Reconductoring	May 2005, Construction in Progress	RMR Criteria	This project in combination with the other listed projects allows ISO/PG&E to meet planning requirements with Hunters Point Power Plant Units 1 and 4 released from their RMR Agreement
6	Ravenswood-Ames 115 kV Lines Reinforcement	May 2005, Engineering in Progress	RMR Criteria	This project in combination with the other listed projects allows ISO/PG&E to meet planning requirements with Hunters Point Power Plant Units 1 and 4 released from their RMR Agreement
7	San Mateo 230 kV Bus Insulator Replacement	May 2005, Engineering in Progress	Operations Requirement During San Mateo Bus Wash	Eliminate bus wash at San Mateo 230 kV bus will reduce the 400 MW generation operational requirement down to less than 200 MW
8	Potrero-Hunters Point (AP-1) 115 kV Cable	December 2005 Pending CPUC Permit Approval	NERC/WECC/CAISO Planning Standards	This project in combination with the other listed projects allows ISO/PG&E to meet planning requirements with Hunters Point Power Plant Units 1 and 4 released from their RMR Agreement

9	Jefferson-Martin 230 kV Line	December 2005 to March 2006	NERC/WECC/CAISO Planning Standards	This project in combination with the other listed projects allows ISO/PG&E to meet planning requirements with Hunters Point Power Plant Units 1 and 4 released from their RMR Agreement
10	Potrero 3 SCR retrofit	February 2005	NERC/WECC/CAISO Planning Standards	This project ensures the availability of Potrero 3 at full capacity thereby reducing overall Greater Bay Area RMR requirements. This project in combination with the other listed projects allows ISO/PG&E to meet planning requirements with Hunters Point Power Plant Units 1 and 4 released from their RMR Agreements
Release Potrero Units 4, 5, & 6 From Their RMR Agreements				
11	San Francisco Electric Reliability Project and San Francisco Airport Electric Reliability Plant	December 2006	NERC/WECC/CAISO Planning Standards	These projects will allow ISO/PG&E to meet planning requirements with Potrero 4, 5, and 6 released from their RMR Agreements
Release Potrero Unit 3 From Its RMR Agreement (assumes previous completion of Peaking Power Plants by the City)				
12	Upgrade the Newark-Dumbarton 115kV line	May 2006	NERC/WECC/CAISO Planning Standards	This upgrade is needed in combination with the other listed mitigations to allow ISO/PG&E to meet planning requirements with Potrero Unit 3 released from its RMR Agreement
13	Upgrade the Bair-Belmont 115kV Line	Under Evaluation By PG&E, likely to be scheduled for 2007	NERC/WECC/CAISO Planning Standards	This upgrade is needed in combination with the other listed mitigations to allow ISO/PG&E to meet planning requirements with Potrero Unit 3 released from its RMR Agreement
14	Upgrade the Metcalf-Hicks & Metcalf-Vasona 230 kV lines	Under Evaluation By PG&E, likely to be scheduled for 2007	NERC/WECC/CAISO Planning Standards	This upgrade is needed in combination with the other listed mitigations to allow ISO/PG&E to meet planning requirements with Potrero Unit 3 released from its RMR Agreement
15	Add voltage support at Ravenswood substation	Under Evaluation By PG&E, likely to be scheduled for 2007	NERC/WECC/CAISO Planning Standards	This upgrade is needed in combination with the other listed mitigations to allow ISO/PG&E to meet planning requirements with Potrero Unit 3 released from its RMR Agreement

Attachment 2

Action Plan for Release of Existing Hunters Point and Potrero Generation from RMR Contracts

Background
The mission of the California Independent System Operator (ISO) is to plan and operate the ISO control area safely and reliably. The ISO sets its reliability standards in compliance with regional and national requirements (Western Electricity Coordinating Council and North American Electric Reliability Council, respectively). We also apply standards that have been developed by the California ISO Planning Standards Committee for application to the ISO control area. The ultimate goal of these standards is to ensure continuous supply of electricity and to avert the risk of blackouts.

The ability to reliably provide electricity to the San Francisco Peninsula Area[1] is based on three critical "load serving" conditions:

1. There is sufficient power to serve the electric needs of customers in local areas;
2. The transmission system is capable of delivering that power to the local area where it is distributed to customers;
3. Power System operators can perform routine equipment maintenance and continue to reliably serve customers even after certain equipment failures occur.

The Action Plan to release existing Hunters Point and Potrero generation from RMR contracts identifies the transmission and generation infrastructure necessary to meet the applicable national, regional, and ISO reliability standards. The dates set forth in this memo are based on expected completion dates and were provided by Pacific Gas and Electric Company (PG&E), the City and County of San Francisco (City) and Mirant who are the entities responsible for completing the transmission and generation projects. PG&E and Mirant are the owners of Hunters Point and Potrero Power Plants, respectively, and control the subsequent shutdown of the power plants.

In 1998, the City entered into an agreement with PG&E to close the Hunters Point Power Plant (Hunters Point) as soon as it is released from the Reliability Must Run Agreement (RMR Agreement). To that end, in approving the Jefferson Martin transmission line, the ISO Board of Governors provided the directive to the ISO to work with the City and County of San Francisco and interested stakeholders with the goal of closing Hunters Point.

Over the past several years and continuing here, the ISO is fulfilling its mission by working with representatives of the City, PG&E, and the Potrero and Hunters Point/Bayshore communities to facilitate appropriate investment in electric transmission and generation infrastructure that will maintain the reliability of the electric system while they pursue the shutdown of existing generation within the City.

---

[1] In the testimony for the Jefferson-Martin Transmission Line, approved by the California Public Utilities Commission on August 19, 2004, the ISO refers to the City and County of San Francisco and the San Francisco Peninsula as the "San Francisco Peninsula Area." For clarity in this memo, the ISO will delineate separately, when necessary, the City, the Peninsula, and the Greater Bay Area even though the City is included in the Peninsula, which is included in the Greater Bay Area.

PG&E and the ISO jointly developed the list of reliability upgrades needed to establish a clear transmission plan to release all of Hunters Point generation from RMR contracts (refer to Attachment 1). It is important to note that the ISO cannot decommission the generation facilities; the ISO will release the Units from their RMR Agreements and PG&E as the plant owner is responsible for the decommissioning process.

Hunters Point Detail
By the end of 2004, PG&E will have completed the one project necessary to allow the release of Hunters Point Units 2 & 3 from their RMR Agreements. The project is the Potrero Static VAR Compensator that will provide enough voltage support for the San Francisco Peninsula Area to displace the need to continue operating Hunters Point Units 2 & 3, which are currently operated as synchronous condensers. However, ISO management will request the re-designation of Hunters Point Units 1 & 4 for the 2005 Contract Year, given that the projects to support the removal of the RMR agreement are not yet completed.

The release of Hunters Point 1 & 4 from RMR obligations are conditioned on completion of the noted transmission projects and the retrofit of Potrero 3. PG&E has continued to move towards completing all of their transmission projects by the end of 2005. And with the recent approval of the Jefferson – Martin 230kV line by the CPUC, the way has been cleared for the last remaining piece of transmission infrastructure to be in-service by the end of 2005 or the first quarter of 2006. Therefore, the continued operation of Hunters Point Units 1 & 4 through 2005 is necessary to serve customer demand for power and provide operational support until those transmission projects are completed. The ISO's current plan is to recommend that the ISO Board of Governors release Hunters Point Units 1 & 4 from their RMR agreements at the September 2005 Board meeting for the 2006 Contract Year.

Potrero Detail
The ISO has determined that generation located in the City will remain critical to the long-term ability to serve load in the San Francisco Peninsula Area. Therefore, following the retirement of Hunters Point, the retirement of any existing Potrero generation requires an equivalent offset of new transmission and/or generation infrastructure. The only new generation currently being proposed is by the City through their San Francisco Electric Reliability Project (SFERP) and the San Francisco Airport Electric Reliability Plant (SFAERP). The SFERP proposes to install three new 48 MW combustion turbines at the existing Potrero Power Plant site and the SFAERP proposes to install one 48 MW combustion turbine at the San Francisco International Airport. The City proposes to have these two projects (collectively the "CT Project") in-service by the end of 2006. Completion of the San Francisco Electric Reliability Project will allow for the release of Potrero Units 4, 5, and 6 from RMR obligations. The current plan is to recommend that the ISO Board of Governors release Potrero 4, 5, and 6 from their RMR agreements at the September 2006 Board meeting for the 2007 Contract Year.

PG&E and ISO have tentatively agreed to evaluate additional transmission projects and the addition of voltage support to achieve the release of Potrero 3 from its RMR obligations. The completion date of these projects is to be determined, but PG&E indicates they are likely to be scheduled for 2007. We will continue to keep the Board of Governors appraised of the progress of this effort. As with the release of other projects from RMR obligations, we expect to release Potrero 3 when the last of these projects are completed.

DC Cable Detail
A High Voltage Direct Current line (DC Cable) capable of carrying 400-600 MW has been proposed by Trans Bay Cable LLC (an affiliate of Babcock & Brown LP). This DC Cable would run between the City of

Pittsburg and the Potrero Substation in San Francisco. This DC Cable is tentatively scheduled for operation by summer 2008. At this time, the proposed DC Cable is an alternative to augment long-term load serving capability for the San Francisco Peninsula area. In deciding on a preferred long-term alternative to serve load beyond 2007, the reliability and economic aspects of the proposed project will be considered and compared to PG&E reinforcing the existing transmission system or building a new 230 kV line to increase power imported into the San Francisco Peninsula.

Attachment 3

Analysis of Options to the Retrofit of Potrero 3

(Based on current ISO 2005 RMR analysis which includes Hunters Point Units 1 & 4)

- **Option 1: Potrero 3 available; retrofitted (ISO Preferred Approach)**
  - Load shedding exposure: None
  - RMR Exposure
    - Release Pittsburg 6 (clean and expensive)
    - Release Pittsburg 7 (dirty and expensive)
  - Operational exposure
    - Increased use of other generating facilities (clean and less expensive than Pittsburg 6)
  - Cost exposure
    - Information released by Mirant puts the retrofit costs at approximately $20M.
  - Environmental exposure
    - The emissions from Potrero Unit 3 are reduced by 80% (reduction of one ton NOx/day). In other words, a retrofitted Potrero 3 only emits 15 lbs/hour

- **Option 2: Potrero 3 available; not retrofitted; operated at reduced level.**
  - Load shedding exposure: None
  - RMR exposure
    - Continue to RMR Pittsburg 6 (clean and expensive)
    - Simultaneously run Pittsburg 5 & 6 and Contra Costa 7 at their maximum in order to operate Potrero 3 up to 140 MW (Overall NOx bubble requirement)
  - Operating exposure
    - Reduced use of remote generating resources that are cleaner and less expensive than Pittsburg 6, given that the Pittsburg 5 & 6 and Contra Costa 7 must run as RMR units. In short, other less expensive/cleaner options will have to be backed down.
  - Cost exposure
    - Additional $30,000,000/year (additional RMR costs incurred by retaining units under RMR that would have otherwise been released if Potrero 3 was retrofit.)
  - Environmental exposure
    - Total lbs/hour of NOx increase by 108 to172 lbs/hour or from 700% to 1,150% over Option 1 emissions

- **Option 3: Potrero 3 not available (Note: This option violates planning criteria and is provided simply to outline the associated risks.)**
    - Load exposure
        - San Francisco Peninsula Area load shedding could be required; up to 50 to 100 MW
        - Up to 30-70 hours per year
    - RMR Exposure
        - Continue to RMR Pittsburg 7 (dirty and expensive)
        - Continue to RMR Pittsburg 6 (clean and expensive)
    - Cost Exposure
        - Additional cost of $100,000,000 - $120,000,000/year (additional RMR costs incurred by retaining units under RMR that would have otherwise been released if Potrero 3 was retrofit.)
    - Operating exposure
        - Does not meet NERC/WECC or MORC Standards
        - Simultaneously run Pittsburg 5 & 6 and Contra Costa 7 at their maximum in order to operate Pittsburg 7 (Overall NOx bubble requirement)
        - Reduced use of other generation (clean & less expensive than Pittsburg 6)
    - Environmental exposure
        - Total lbs/hour of NOx increase by 175 to 239 lbs/hour or 1,166% to 1,593% over Option 1 emissions.

Attachment 4

Discussion of the Potrero 3 Retrofit

Key Study Assumptions in Creating a Potrero Retirement Plan
The retrofit of Potrero 3 continues to be part of the Action Plan to release Hunters Point from its RMR contract. The retrofit is to install emission control technology that will allow the unit to operate at its current 207 MW capacity. Potrero 3 will operate cleaner until it is shut down after the projects listed in Attachment 1 are completed.

The ISO was asked to evaluate the release of Hunters Point from its RMR obligations in early 2003. We responded in a letter to the City dated April 18, 2003 that outlined a plan for the retirement of Hunters Point 4 and identified the Potrero 3 retrofit as part of the plan. We have reiterated our support for the retrofit in subsequent 2003 and 2004 correspondence. We also encouraged the timely completion of the City's combustion turbine project, the Jefferson-Martin transmission project, and other PG&E transmission projects.

Since our initial discussions, PG&E's Jefferson-Martin transmission project and the City's combustion turbine project have been delayed to early and late 2006, respectively. A description of the legal challenges to the Potrero retrofit follows.

Challenge to Potrero Retrofit
On July 14, 2004, an appeal was filed with the San Francisco Board of Appeals challenging the granting of permits by the Planning and Building Departments that are necessary for the retrofit of Potrero Unit 3. The filing of an appeal in San Francisco stays the permit, and Mirant has been unable to proceed with any work on their retrofit. This has changed the outage schedule for this unit and alters the sequenced and interdependent outages coordinated in this area for both generation and transmission. In addition, a lawsuit has been filed at the San Francisco Superior Court on September 2, 2004, challenging the Bay Area Air Quality Management District's approval of the SCR for Potrero Unit 3. These actions have already delayed the retrofit of Potrero Unit 3 at a minimum, and could result in Potrero Unit 3 not being retrofitted as originally contemplated in the ISO's previous plans. In order to proceed with the analysis, staff felt that several alternative approaches must be assessed to outline for the Board the available options and the consequences associated with the operation of Potrero Unit 3 both with and without the retrofit. Following is a discussion of the options in detail (Attachment 3).

Operation of Potrero Unit 3 With and Without the Retrofit for 2005
Anticipating that the retrofit of Potrero Unit 3 could not be achieved in 2005, ISO Staff has assessed the opportunity to continue to operate Potrero Unit 3 without the proposed SCR retrofit. The continued operation of Potrero Unit 3 without an SCR retrofit is possible, provided its emissions are offset by cleaner emissions from other SCR retrofitted Mirant units located within the Bay Area NOx bubble. At present, Mirant owns Potrero as well as generation units at Pittsburg and Contra Costa. Pittsburg Units 5 and 6 and Contra Costa Unit 7 have already been SCR retrofitted and more than meet the NOx requirements for 2005 and beyond. Potrero Unit 3 could continue to be operated at a reduced level of 140 MW, provided

Pittsburg Units 5 and 6 and Contra Costa Unit 7 are run concurrently to meet Mirant's overall Bay Area NOx limit requirement. With Mirant running the Pittsburg and Contra Costa units that have combined emissions less than allowed by the 2005 standard, "room" within the NOx Bubble is created to operate Potrero Unit 3 at a reduced level. This level of generation is projected to be sufficient to meet San Francisco Peninsula Area reliability requirements in 2005, provided Hunters Point Units 1 and 4 remain available through 2005 or until all the identified transmission projects are placed in-service.

Release of Potrero Units 4, 5, and 6 from the RMR Agreement

The ISO has determined that generation located in the City will remain critical to the long-term ability to provide the capacity and energy needed to serve load in the San Francisco Peninsula Area. Therefore, following the retirement of Hunters Point, the retirement of any existing Potrero generation requires an equivalent offset of new transmission and/or generation infrastructure. The only new generation currently being proposed is by the City through their San Francisco Electric Reliability Project (SFERP) and the San Francisco Airport Electric Reliability Plant (SFAERP). The SFERP proposes to install three new 48 MW combustion turbines at the existing Potrero Power Plant site and the SFAERP proposes to install one 48 MW combustion turbine at the San Francisco International Airport. The City proposes to have these two projects (collectively the "CT Project") in-service by the end of 2006. The ISO has determined that the CT Project will provide the needed capacity and energy required to replace the older Potrero combustion turbine units and to continue the forward movement needed to ultimately release Potrero Unit 3 from its RMR Agreements. Therefore, once the CT Project is placed in-service, the ISO will release Potrero Units 4, 5, and 6 from their RMR Agreement.

Release of Potrero Unit 3 From the RMR Agreement

At the present time, the ISO assumes that the City's electric reliability projects will replace the existing Potrero combustion turbine Units 4, 5, and 6. Unfortunately, the load serving capability that the City's generation projects provide to the San Francisco Peninsula Area is approximately 40 MW greater than the 150 MW of existing combustion turbine generation it replaces, falling short of the Area's projected electric growth that is expected to occur during this time frame if Potrero Unit 3 were also retired[2]. As such, additional transmission facilities beyond those already identified for retiring Hunters Point are needed to not only make up this shortfall, but also provide additional load serving capacity many years into the future.

ISO Staff supports transmission system reinforcements to allow for reliable electric system operation with the Potrero Unit 3 released from its RMR contract. This involves reinforcement of the existing transmission system through mitigating certain transmission line overloads that are projected to occur under contingency conditions and adding the necessary voltage support to account for the impacts of increased imported power into San Francisco. The transmission overloads that need to be addressed before Potrero Unit 3 can be retired are listed in Attachment 1. ISO Staff has discussed these transmission overloads with PG&E and requested them to assess and determine the appropriate transmission projects for relieving them. Until PG&E has had an opportunity to conduct an in-depth review, these transmission needs and their corresponding transmission projects, identifiable in-service dates cannot be accurately determined; however, PG&E indicates that they are likely to be scheduled for 2007. PG&E has agreed to include all of these upgrades in their 2005 transmission expansion assessment.

[2] San Francisco reached a new peak on September 7, 2004 of 931 MW. This number represents the peak forecast for 2006 (936 MW) and it is already being reached in 2004.

Notwithstanding PG&E's final review of these transmission requirements, the ISO hopes that the necessary transmission upgrades could be in place as soon as possible to allow for the retirement of Potrero Unit 3 at the earliest possible time. To this end, the ISO remains committed to a continued and positive working relationship with PG&E towards the timely completion of these necessary transmission upgrades.

Attachment 5

What is RMR, and Why are Hunters Point and Potrero Units Under RMR Contracts

Over the years, many generation and transmission expansion projects were built to serve the increasing consumer load growth. These projects were integrated with the facilities that preceded them. In many cases, certain generation-related components, in whole or in part, complement transmission-related components. For example, generation-related components complement the transmission grid in several ways; providing voltage support, reducing heavy power flows on certain transmission lines, and minimizing the oscillatory nature of the electric system, among others. In these situations, generation and transmission facilities are interdependent in maintaining grid reliability such that changes in either could have a detrimental impact on the acceptable performance and operation of the interconnected transmission grid.

Prior to the restructuring of the electricity market in California, generation was owned and operated by the investor owned utilities and was operated as an integral part of the utilities interconnected transmission grid in a manner to reliably serve their load. Because some generation is located in critical local areas, its dispatch was required, sometimes uneconomically, to meet the system's reliability needs. California's restructured electric market allowed for the majority of the generation owned by investor owned utilities to be sold to third parties. With this change in ownership, generator owners were not obligated to run their generator units in this manner and the CAISO did not have the ability to achieve this must-run requirement without a contracted requirement. As a result of this change, Reliability Must Run ("RMR") was established where generation can be dispatched by the CAISO to primarily assure local area reliability needs are met and local area load can be reliably served[3] and secondly to mitigate the local market power that owners can exercise. In short, an RMR designation of any generation facility is to simply say that a set of power system conditions can exist in a particular geographic area that can only be remedied by localized support from a specific generator.

The San Francisco Peninsula Area is a local area Reliability Must-Run sub-area that is considered in the ISO's annual RMR assessment. This is a sub-area within the Greater Bay Area local RMR area. The San Francisco Peninsula Area is generally represented by PG&E's service territory running north from Ravenswood substation (in the vicinity of the City of Palo Alto) and including the City and County of San Francisco ("San Francisco"). The ability to serve electric load in this area is impacted by not only generation and transmission facilities within this area, but also transmission facilities connecting from the Greater Bay Area.

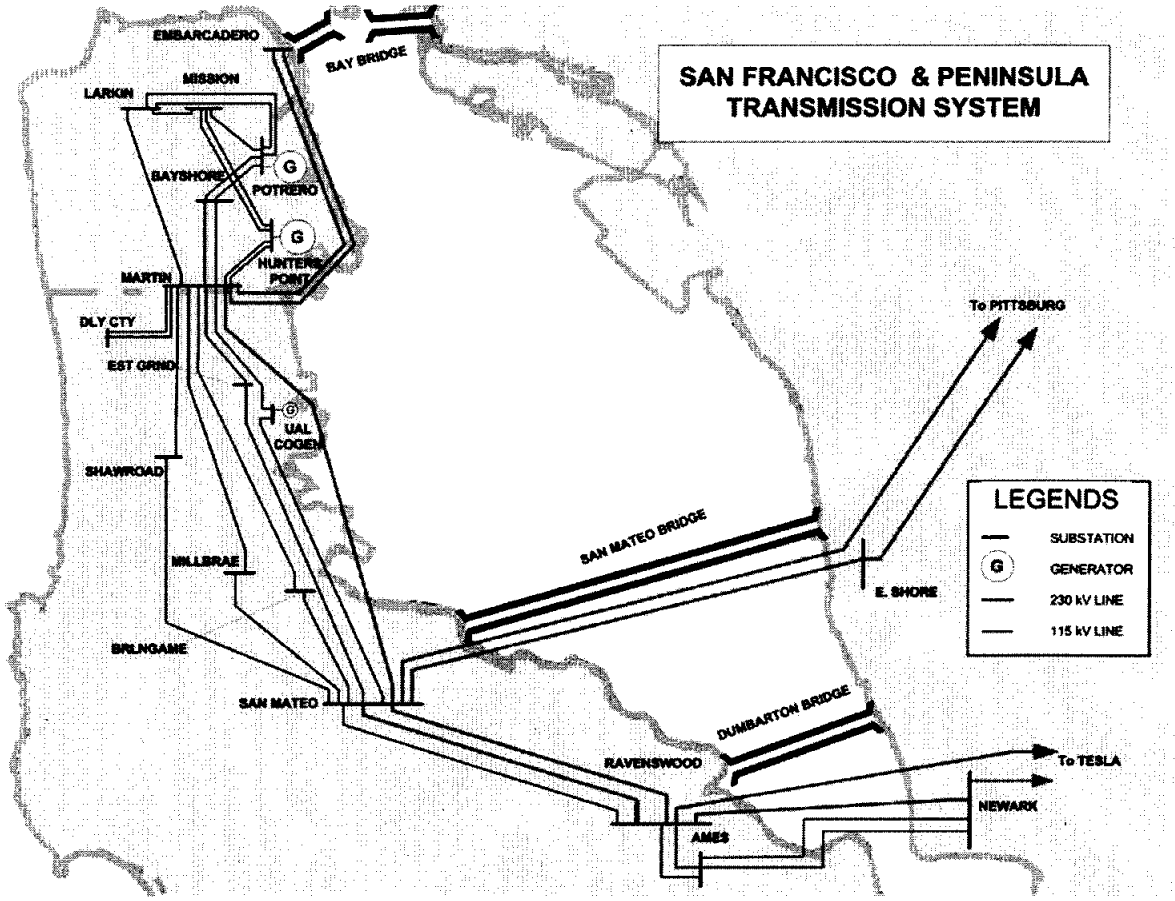
Two key generation facilities for serving load within the San Francisco Peninsula, Hunters Point and Potrero, are located within the city of San Francisco. They are currently under RMR contract for 2004 and are being re-designated for an RMR contract for 2005. For 2004, RMR generation at Hunters Point and

---

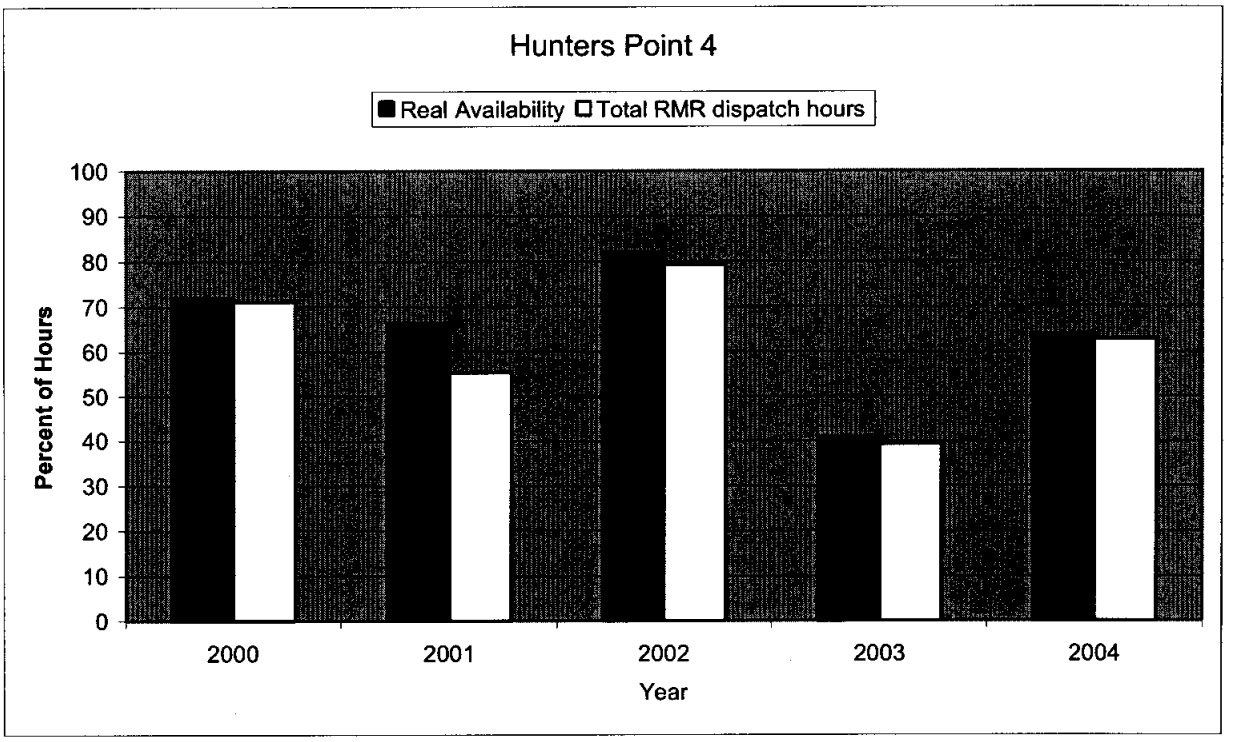
[3] **Reliability Must-Run Generation** - Generation that the ISO determines is required to be on line to meet Applicable Reliability Criteria requirements. This includes i) Generation constrained on line to meet NERC and WECC reliability criteria for interconnected systems operation; ii) Generation needed to meet Load demand in constrained areas; and iii) Generation needed to be operated to provide voltage or security support of the ISO or a local area.

Potrero is mainly determined by an outage of the Tesla – Metcalf 500kV line and the Delta Energy Center. The system limitation that determines the amount of RMR generation is the resulting loading on the Tesla – Newark #2 230kV line. As a result of the 2004 RMR designation, PG&E proposed to upgrade the Tesla – Newark #2 230kV line to mitigate this overload and to assist in addressing the need to RMR generation at Hunters Point. The ISO accepted PG&E's proposal and PG&E included the project in their 2004 Transmission Expansion Plan as a transmission RMR project for completion by May 1, 2005.

The 2005 RMR process has been completed and ISO staff will again recommend the re-designation of all generator units at Hunters Point and Potrero Power Plants except Hunters Point Units #2 & #3. Units #2 & #3 have been operating as synchronous condensers for the last three years where they have only been supplying needed voltage support. They will be replaced by a Static Var Compensator currently under construction at Potrero Substation and scheduled for operation in December 2004. For 2005, the amount of required RMR generation for San Francisco is determined by an outage of the Newark – Ravenswood 230kV line and Potrero Unit 3. The system limitation that determines the amount of required RMR generation is the loading on the Newark – Ames 115kV lines. These lines are part of the 230 and 115 kV lines over which power is imported into the San Francisco Peninsula area.


SAN FRANCISCO & PENINSULA
TRANSMISSION SYSTEM
EMBARCADERO
BAY BRIDGE
MISSION
LARKIN
BAYSHORE
POTRERO
HUNTERS POINT
MARTIN
DLY CTY
EST GRND
UAL COGEN
SHAWROAD
MILLBRAE
BRLNGAME
SAN MATEO
SAN MATEO BRIDGE
E. SHORE
To PITTSBURG
DUMBARTON BRIDGE
RAVENSWOOD
To TESLA
NEWARK
AMES
LEGENDS
SUBSTATION
GENERATOR
230 kV LINE
115 kV LINE

Attachment 6



Based on past maintenance records, PG&E has already overhauled the boiler, generator (rotor) and low-pressure turbine and modified and tuned the NOx emission controls. These items required long periods of downtime for the unit and contributed to the low availability of this unit in the past. One could conclude that the unit's availability outlook for 2005 should be better then average (>65%) since most of the major items are now in good shape.

In the past the ISO has used very few RMR starts for this unit (0-5 per year). When available this unit is dispatched to maintain the reliability of the local area. Limiting the starts protects the area residents from high emission pollutants during start-up.

Energy Resources Conservation
and Development Commission

Application for Certification for the SAN FRANCISCO ELECTRIC RELIABILITY PROJECT (SFERP)	))))	Docket No. 04-AFC-1

PROOF OF SERVICE

I, ARLENE G. HALL, declare that on October 12, 2004, I deposited copies of the attached **DATA RESPONSES, SET 2A (RESPONSES TO DATA REQUESTS: 157-159)**, in the United States mail in San Francisco, California, with first-class postage thereon fully prepaid and addressed to all parties on the attached service list.

I declare under the penalty of perjury that the foregoing is true and correct.

ARLENE G. HALL

SERVICE LIST
04-AFC-1

DOCKET UNIT

Send the original signed document plus 12 copies to the following address:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 01-AFC-17
DOCKET UNIT, MS-4
1516 Ninth Street
Sacramento, CA 95814-5512

In addition to the documents sent to the Commission Docket Unit, also send individual copies of all documents to:

APPLICANT

Jesse Blout - Economic Development Director
Office of the Mayor
City and County of San Francisco
1 Dr. Carlton B. Goodlett Place, Room 200
San Francisco, CA 94102-4641

Applicant Project Manager

Karen Kubick, P.E.
San Francisco Public Utilities Commission
General Manager's Office
1155 Market St., 11th Floor
San Francisco, CA 94103

APPLICANT'S CONSULTANTS

Steve De Young
De Young Environmental Consulting
4155 Arbolado Drive
Walnut Creek, CA 94598

John Carrier
CH2MHill
2485 Natomas Park Drive, Suite 600
Sacramento, CA 95833-2943

COUNSEL FOR APPLICANT

Jeanne Sole
San Francisco City Attorney
City Hall, Room 234
1 Dr. Carlton B. Goodlet Place
San Francisco, CA 94102-4682

INTERESTED AGENCIES

Emilio E. Varanini, III, General Counsel
California Power Authority
910 P Street, Suite 142A
Sacramento, CA 95814

Independent System Operator
Jeffery Miller
151 Blue Ravine Road
Folsom, CA 95630

Electricity Oversight Board
770 L Street, Suite 1250
Sacramento, CA 95814

INTERVENORS

Jeffrey S. Russell
Vice President, West Region Operations
Mirant California, LLC
1350 Treat Blvd., Suite 500
Walnut Creek, CA 94597

Michael J. Carroll
Latham & Watkins LLP
650 Town Center Drive, Suite 2000
Costa Mesa, CA 92626

Potrero Boosters Neighborhood Asso.
Dogpatch Neighborhood Asso
Joseph Boss
934 Minnesota Street
San Francisco, CA 94107

Robert Sarvey
501 West Grantline Road
Tracy, CA 95376

Greenaction for Health &
Environmental Justice
C/o Marc Harrison
Karl Krupp
One Hallidie Plaza #760
San Francisco, CA 94706

Californians for Renewable Energy, Inc.
Michael E. Boyd, President
5439 Soquel Drive
Soquel, CA 95073

Lynee Brown
24 Harbor Road
San Francisco, CA 94124