COSUMNES POWER PLANT
(01-AFC-19)

AFC SUPPLEMENT A
(Revised General Arrangement)

Submitted by

SACRAMENTO MUNICIPAL UTILITY DISTRICT (SMUD)

March 15, 2002

CH2MHILL

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

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1.0 INTRODUCTION

The Sacramento Municipal Utility District (SMUD or District) proposes to develop a natural gas-fueled power plant at the southern edge of the Sacramento County, California called the Cosumnes Power Plant (CPP). On September 13, 2001, the District filed an Application for Certification (AFC) with the California Energy Commission (CEC). Supplemental materials, added to the AFC as a result of the CEC's October 11, 2001 Data Adequacy recommendation letter, were docketed on November 13, 2001.

The District is filing this Supplement A to the Cosumnes Power Plant AFC to provide the Commission and the public with additional information regarding refinements and enhancements to the plant design that was analyzed in the AFC. In simplest terms, the information presented in this Supplement A evaluates the impacts associated with modifying the project's Site Plan.

1.1 Revised Site Plan

As discussed in the AFC, the CPP is planed for development in two phases. As engineering design has progressed, the engineers have decided to make a minor change in the plant's footprint. It is proposed that the location of the steam turbine generator and the southern-most combustion turbine generator will be exchanged. The change will be reflected in each phase.

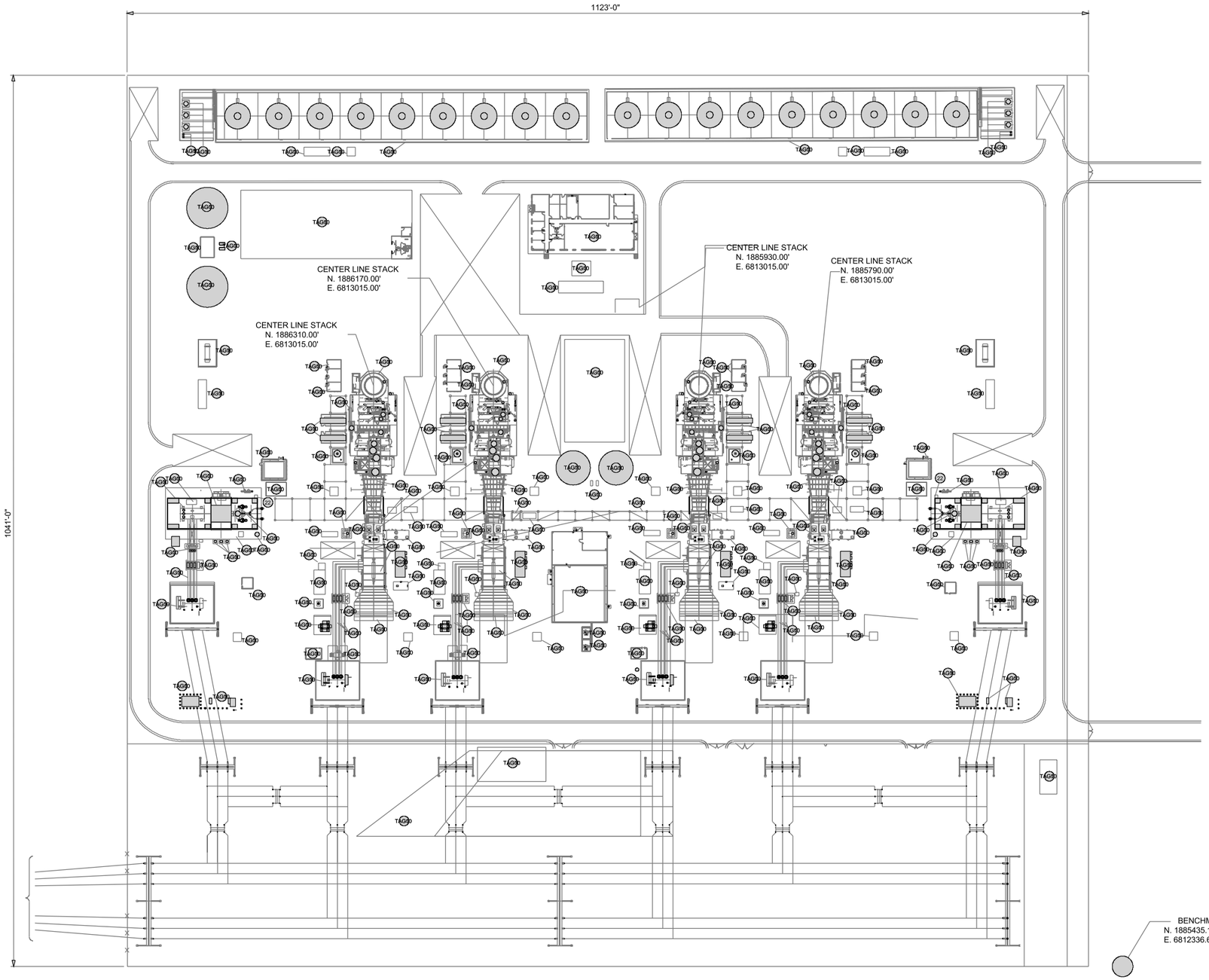
1.2 Organization of Supplement A

AFC Supplement A is divided into the following sections. Section 2.0 discusses changes to the proposed site plan. Section 3.0 analyzes the potential environmental impacts associated with the revised site plan.

2.0 REVISED SITE PLAN

To make operations and maintenance of CPP more efficient, the design engineers have further refined the site plan described in the AFC. It is proposed that the location of the steam turbine generator (STG) be moved from the center of the power block to the southern end of the power block and that the second combustion turbine generator (CTG) be moved from the southern end of the power block to be located south of the first CTG. With this configuration, the plant would have both CTGs at the north end of the power block with the STG to the south. This change would be mirrored in the second phase of the plant. In addition, the height of the HRSG exhaust stacks would be increased from 160 to 165 feet tall.

A new site plan showing the proposed change is presented in Figures 1.1-3R and 2.2-1R. In addition, a new elevation is provided as Figure 2.2-2R. These figures replace those previously submitted in the AFC.



LEGEND

1. ELECTRICAL SWITCHYARD AREA
2. SWITCHYARD CONTROL BUILDING
3. GENERATOR STEP-UP TRANSFORMER
4. UNIT AUX. TRANSFORMER (18/4.16kV)
5. EXCITATION TRANSFORMER
6.
7. 4160V/480V TRANSFORMERS
8. DEMINERALIZED WATER PUMPS
9.
10. ISO-PHASE BUS DUCT
11. PACKAGED ELECTRICAL AND ELECTRONIC CONTROL CENTER (PEECC)
12. CT GENERATOR
13. CT AUXILIARY PACKAGE
14. ISOLATION TRANSFORMER
15. GAS TURBINE AIR INLET FILTER
16. GENERATOR BREAKER
17. COMBUSTION TURBINE (CT)
18. COMPRESSOR WATER WASH SKID
19. STG ELECTRICAL EQUIPMENT BLDG.
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21. STG LUBE OIL
22. GLAND STEAM SKID
23. GLAND STEAM CONDENSER
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34. BOILER FEED PUMPS
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36. CEM/HR DPU SHELTER
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38. ADMINISTRATION AND CONTROL ROOM
39. SERVICE/FIRE WATER STORAGE TANK
40. FIRE PUMPS
41.
42.
43. EQUIPMENT DRAIN SUMP
44. DEMINERALIZED WATER STORAGE TANK - (2 @ 250,000 gallons)
45. WATER TREATMENT BUILDING
46. DETENTION POND
47. AUXILIARY COOLING WATER PUMPS
48. CIRCULATING WATER PUMPS
49. ELECTRICAL EQUIPMENT BLDG
50. OIL/WATER SEPARATOR
51. COOLING TOWER ELECTRICAL EQUIPMENT BLDG
52. COOLING TOWER
53. CT DRAIN SUMP
54. LEACH FIELD
55. SEPTIC TANK
56. FILTER WATER PUMPS
57. FIRE PROTECTION DELUGE HOUSE
58. COOLING TOWER CHEMICAL STORAGE
59. CO2 SKID PURGE
60. LCI/GENERATOR EXCITATION COMPARTMENT
61. CLOSED LOOP AUX. COOLING WATER HEAT EXCHANGER AND PUMPS
62. DC LINK REACTOR
63. AMMONIA STORAGE TANKS
64. C02 FIRE PROTECTION
65. HYDROGEN TANKS
66. ELECTRICAL MANHOLE
67.
68. NEUTRAL GROUNDING TRANSFORMER/RESISTOR CUBICLE
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70. SCR SKID
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72.
73. STORM DRAIN MANHOLE
74. PUMP PIT (RETENTION POND)
75. OVER FLOW (RETENTION POND)
76.
77. GAS REGULATOR AND COMPRESSOR STATION
78. FUEL GAS PERFORMANCE HEATER
79.
80.
81. PIPE RACK
82.
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COSUMNES POWER PLANT

DRAWN	DESIGNED		CHECKED	
APPROVED	CADD DRAWING NUMBER		SHEET	REV
APPROVED				

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500 0 500 Feet

SCALE IS APPROXIMATE

FIGURE 1.1-3R
SITE PLAN
COSUMNES POWER PLANT
APPLICATION FOR CERTIFICATION

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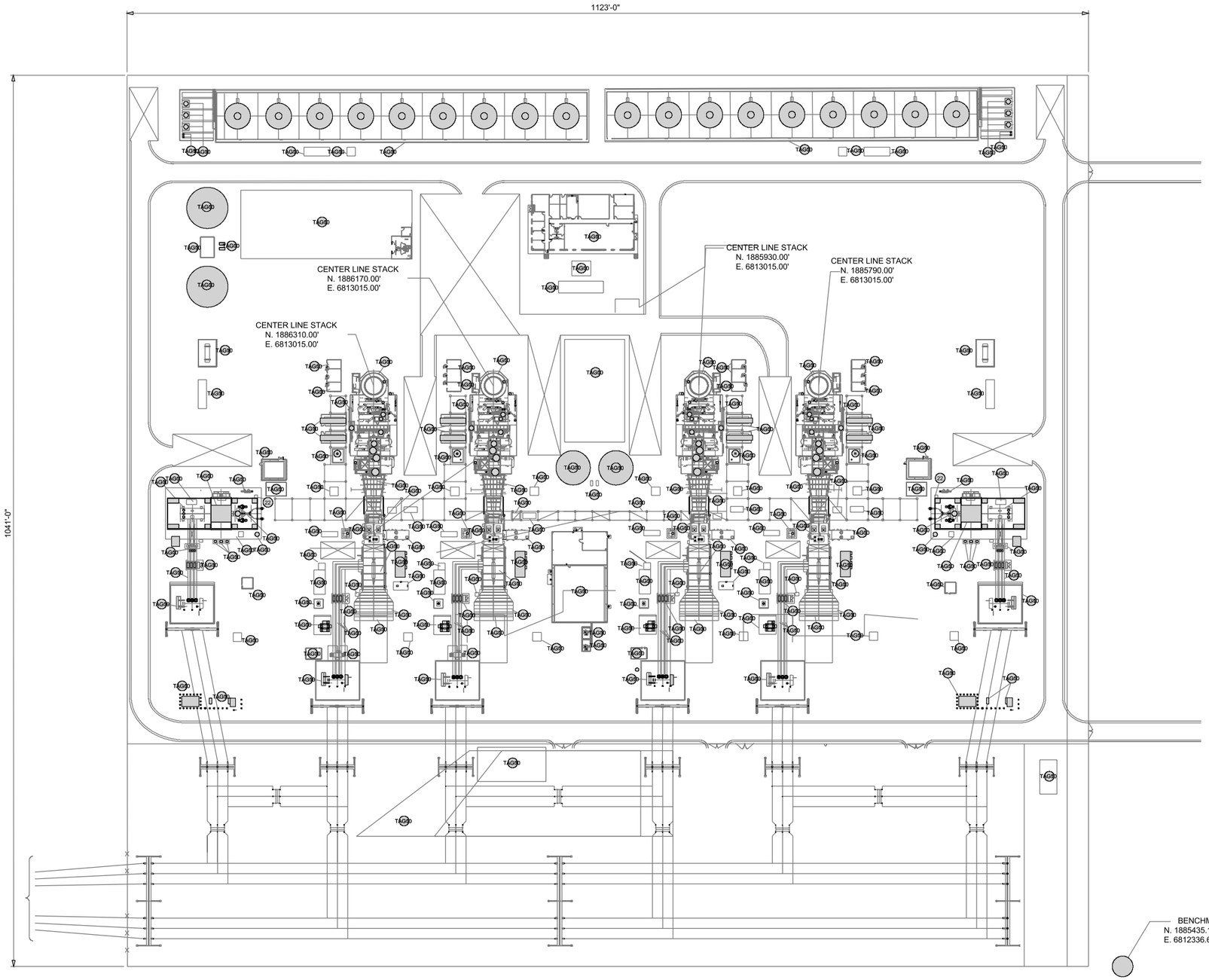

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COSUMNES POWER PLANT

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APPROVED			

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500 0 500 Feet

SCALE IS APPROXIMATE

FIGURE 2.2-1R
PLOT PLAN
(PHASES 1 AND 2)

COSUMNES POWER PLANT
APPLICATION FOR CERTIFICATION

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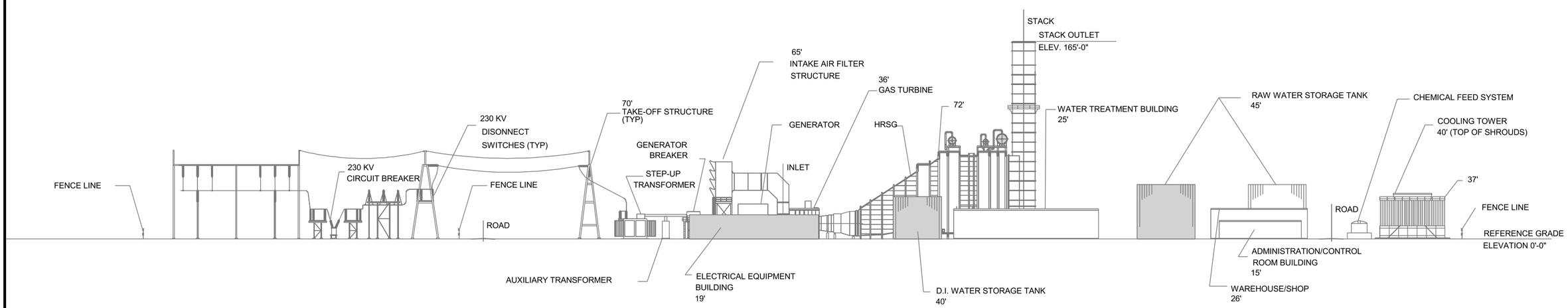

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COSUMNES POWER PLANT
GENERAL ARRANGEMENT
ELEVATION

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SCALE IS APPROXIMATE

FIGURE 2.2-2R
PLANT SOUTH ELEVATION

COSUMNES POWER PLANT
APPLICATION FOR CERTIFICATION

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3.0 ANALYSIS OF REVISED SITE PLAN

This Section contains an assessment of potential environmental impacts resulting from the change in location of the CTG and STG and increase in stack height. In addition, mitigation measures are included, if necessary, to reduce the level of impacts below the level of significance.

3.1 Air Quality

3.1.1 Overview of the Analytical Approach to Estimating Facility Impacts

This discussion presents an evaluation of the air quality impacts of the new facility layout. Only those portions of the original AFC air quality discussion that are affected by this revised proposal are presented herein; those portions not presented remain unchanged.

The emissions sources at CPP include four gas turbines with unfired heat recovery steam generators, two steam turbines, and two cooling towers. No changes are proposed to emission rates or operating scenarios.

3.1.2 Air Quality Impact Analysis

3.1.2.1 Good Engineering Practice Stack Height

As in the original analysis, BEE-BPIP was used to derive 36 direction-specific building dimensions for the revised facility layout. As structure heights did not change as a result of the relocations, the GEP stack height of 213 feet is unchanged. The new turbine/HRSG stack height of 165 feet still does not exceed GEP stack height.

3.1.2.2 Turbine Screening Analysis

As in the original AFC, a screening procedure was used to determine which operating condition would result in the maximum impact for each pollutant and averaging period. The emission rates and exhaust parameters used in the screening analysis were identical to those shown in Appendix 8.1D, Table 8.1D-1 of the AFC. The results of the screening procedure are shown in Appendix 8.1D (Revised), Table 8.1D-2R (revised), attached, and Table 8.1-24R (revised), below.

3.1.2.3 Refined Air Quality Impact Analysis

As in the original AFC, the gas turbine parameters found in the screening analysis to produce maximum modeled impacts for each pollutant and averaging period were used in the refined air quality impact analysis. As the cooling towers are exempt from permitting under Sacramento Metropolitan Air Quality Management District (SMAQMD) regulations, they were excluded from the modeling analysis for demonstrating compliance with SMAQMD's NSR/PSD regulations. However, the cooling towers were included in the analysis of impacts under CEQA.

TABLE 8.1-24R
Results of Screening Procedure: New Gas Turbines/HRSGs
Operating Conditions Producing Maximum Modeled Ambient Impacts

Pollutant	Averaging Period	Gas Turbine Load (percent)	Ambient Temperature (°F)
NOx	1-hour	50	34
	Annual	50	34
SO_2	1-hour	50	34
	3-hour	50	34
	24-hour	50	34
	Annual	50	34
CO	1-hour	50	34
	8-hour	100	34
PM_{10}	24-hour	50	104
	Annual	50	104

3.1.2.4 Specialized Modeling Analyses

The specialized modeling analyses described in detail in the AFC were revised to reflect the new stack heights and facility layout. These analyses include inversion breakup fumigation (shown in Appendix 8.1D (Revised), Table 8.1D-4R) and turbine startup.

3.1.2.5 Results of the Ambient Air Quality Modeling Analysis

TABLE 8.1-26R
Summary of Results from Refined Modeling Analyses (µg/m^3)

		Refined Modeling			
		Gas Turbines[a]	Entire Facility[b]	Fumigation[a]	Startup[c]
NOx	1-hour	18.1	18.1	2.7	260.2
	Annual[d]	0.23	0.23	n/a	n/a
SO_2	1-hour	1.4	1.4	0.21	n/a
	3-hour	0.9	0.9	0.19	n/a
	24-hour	0.4	0.4	0.1	n/a
	Annual	0.03	0.03	n/a	n/a
CO	1-hour	26.4	26.4	3.9	977.5
	8-hour	176.4	176.4	2.7	n/a
PM_{10}	24-hour	4.5	4.5	0.9	n/a
	Annual	0.21	0.24	n/a	n/a

[a] Gas Turbines only.
[b] Gas Turbines and cooling towers.
[c] Gas Turbines only; two turbines in startup at worst-case hourly emission rate of 240 lb/hr NOx each and two turbines at full load.
[d] NOx corrected for NO_2 using Ambient Ratio Method (ARM) USEPA default factor of 0.75.

3.1.2.6 Impacts During Turbine Commissioning

As discussed in the AFC, the highest expected NOx and CO emissions during commissioning are expected to be 432 lbs/hr and 902 lbs/hr, respectively. The revised

turbine screening analysis showed that the highest one-hour NOx and CO unit impacts are 14.01 µg/m³ per 4.0 g/s. Using the 432 lbs/hr (54.5 g/s) NOx and the 902 lbs/hr (113.8 g/s), CO emission rates yield a maximum one-hour NOx impact during commissioning of 190.9 µg/m³ and a maximum CO impact of 398.6 µg/m³. Using the background NO_2 and CO concentrations of 152 and 9,200 µg/m³, respectively, the total NO_2 impact will not exceed 342.9 µg/m³ and the total CO impact will not exceed 9,598.6 µg/m³. These impacts are well below the state one-hour NOx and CO standards of 470 and 23,000 µg/m³, respectively.

3.1.2.7 Ambient Air Quality Impacts

Maximum ground-level impacts are due to operation of the facility are shown together with the ambient air quality standards in Table 8.1-28R (revised).

Table 8.1-28R
Modeled Maximum Project Impacts

Pollutant	Averaging Time	Maximum Facility Impact[a] (µg/m³)	Background Concentrations (µg/m³)	Total Impact (µg/m³)	State Standard (µg/m³)	Federal Standard (µg/m³)
NO_2	1-hour	260.2 [b]	152.3	412.5	470	--
	Annual	0.23 [c]	20.7	20.9	--	100
SO_2	1-hour	1.4	78.6	80.0	650	--
	24-hour	0.4	47.2	47.6	109	365
	Annual	0.03	13.1	13.1	--	80
CO	1-hour	977.5	9,200	10,178	23,000	40,000
	8-hour	176.4	8,165	8,341	10,000	10,000
PM_{10}	24-hour	4.5	88	92.5	50	150
	Annual[d]	0.24	21.3	21.5	30	--
	Annual[e]	0.24	25.3	25.5	--	50

[a] Entire facility including Gas Turbines and cooling towers.
[b] Reflects two turbines in startup at worst-case NOx emission rate of 240 lbs/hr. Impacts during other operating conditions will not exceed 18.1 ug/m³.
[c] ARM-corrected using EPA correction factor of 0.75.
[d] Annual Geometric Mean (state).
[e] Annual Arithmetic Mean (federal).

3.1.3 PSD Requirements

3.1.3.1 Impacts in Class I Areas

As the maximum modeled impacts of the project are slightly lower than under the original design, modeled impacts in the nearby Class I areas will also be slightly lower than those shown in the AFC (Table 8.1-30).

3.1.4 Health Risk Assessment

The results of the revised screening health risk assessment are summarized in Table 8.1-31R (revised), below. Detailed results are included in Appendix 8.1E (Revised), attached.

Table 8.1-31R
Screening Health Assessment Results

Cancer Risk to Maximally Exposed Individual	0.26 in one million
Acute Inhalation Hazard Index	0.10
Chronic Inhalation Hazard Index	0.015
Chronic Noninhalation Exposure	2.37×10^{-4}

3.1.5 Consistency with Regulatory Requirements

3.1.5.1 Applicability of PSD Requirements

The following table compares the modeled impacts of the facility with the PSD significance and preconstruction monitoring thresholds. Only pollutants for which PSD is applicable are shown. This comparison demonstrates that the modeled impacts are below these thresholds and that no increments analysis or preconstruction monitoring are required.

TABLE 8.1-33R
Comparison of Maximum Modeled Impacts with PSD Significance and Preconstruction Monitoring Thresholds

Pollutant	Avg. Period	Facility Maximum Modeled Impacts, $\mu g/m^3$	PSD Significance Threshold, $\mu g/m^3$	PSD Preconstruction Monitoring Threshold, $\mu g/m^3$
NOx	Annual	0.23	1	14
SO_2	3-hour	0.9	25	n/a
	24-hour	0.4	5	13
	Annual	0.03	1	n/a
CO	1-hour	977.5	n/a	n/a
	8-hour	176.4	n/a	575

3.1.5.2 Offset Requirements

As discussed in the AFC, maximum expected emissions for Phase I of the project are above the 99-ton-per-year offset trigger level. However, the SMAQMD's NSR rule provides an exemption from CO offset requirements if the project's maximum modeled 8-hour CO impact is less than 500 $\mu g/m^3$. As shown in Table 8.1-28R, maximum modeled 8-hour CO impacts remain well below 500 $\mu g/m^3$.

The SMAQMD's NSR rule also requires a demonstration that project emissions will not cause or contribute to a violation of ambient air quality standards before offsets are considered. As shown in Table 8.1-33R above, modeled impacts are below the PSD significance thresholds; therefor, the impacts of the project are not considered to be significant. Based on this showing, interpollutants offsets may be used for the project.

3.2 Biological Resources

Changing the location of the STG and CTG within the power block and raising the height of the exhaust stacks 5 feet would have no additional effect on biological resources, as discussed in the AFC.

The addition of the compression and valve stations will have a minor temporary impact to biological resources. The

3.3 Cultural Resources

Changing the location of the STG and CTG within the power block and raising the height of the exhaust stacks 5 feet would have no additional effect on cultural resources, as discussed in the AFC.

3.4 Land Use

Changing the location of the STG and CTG within the power block and raising the height of the exhaust stacks 5 feet would have no additional land use impacts other than those discussed in the AFC. The height of the exhaust stacks has changed from 160 feet to 165 feet tall. Consequently, a height variance would still be required from the County.

3.5 Noise

The noise modeling performed in the AFC was rerun to determine if the change in location of the equipment and raising the height of the exhaust stacks 5 feet would adversely affect the noise contours provided in the AFC. The results of the modeled showed that the revised footprint would not substantially change the projected noise contours (see Figure 8.5-2R). In fact, the noise levels would be slightly quieter with the new configuration.

3.6 Public Health

Since the change in location and increased stack heights of the turbines reduced maximum modeled impacts slightly, the change would not have adverse impacts to Public Health. (See also revised Appendix 8.1E).

3.7 Worker Health and Safety

Construction impacts would be the same regardless of the location of the equipment or height of the stacks. Therefore, the AFC adequately addressed worker health and safety issues.

3.8 Socioeconomics

Changing the location of the STG and CTG within the power block or raising the stack height would have no additional effect on workforce requirements or other Socioeconomic issues, as discussed in the AFC.

3.9 Agriculture and Soils

Changing the location of the STG and CTG within the power block or raising the stack height would have no additional effect on agriculture and soils from that discussed in the AFC.

3.10 Traffic and Transportation

Changing the location of the STG and CTG within the power block or raising the stack height would have no additional effect on traffic and transportation issues as discussed in the AFC.

3.11 Visual Resources

Changing the configuration of the power block would not create any additional impacts from those discussed in the AFC. When comparing the revised simulations (see attached simulations (Figures 8.11-2bR and 8.11-3bR) to the simulations included in the AFC, there are some noticeable differences when viewed side-by-side. However, the effects on the views from both KOP 1 and 2, as shown in the attached revised simulations, would be virtually the same as those presented in the AFC. Therefore, the visual impacts on views from the KOPs resulting from the changed plant configuration would remain adverse but not significant.

Data Request 96 (Set 1) requests that KOPs 1 and 2 be revised to show the proposed single-pole transmission towers. The attached simulations have been revised to show the proposed change in the power block and the single-pole transmission towers (see Figures 8.11-2bR and 8.11-3bR). As shown in the attached simulations, the transmission tower revision would not significantly alter the views from the KOPs, when compared to the simulations included in the AFC.

Also, as requested in Data Requests 87 and 88, copies of these revised simulations for KOPs 1 and 2 are being provided under separate cover to the CEC on CD-ROM (i.e., as a part of Data Response, Set 1G).

3.12 Hazardous Materials Handling

Changing the location of the STG and CTG within the power block or raising the stack height would have no effect on hazardous materials handling issues from those discussed in the AFC.

3.13 Waste Management

Changing the configuration of the power block or raising the stack height would not create any additional impacts to waste management from those discussed in the AFC.

3.14 Water Resources

Changing the location of the STG and CTG within the power block or raising the stack height would have no effect on water resource issues from those discussed in the AFC.

However, it would require a change in the grading and drainage plan for the facility. Therefore, Figure 8.14-4 has been revised. The new figure, Figure 8.14-4R, is attached.

3.15 Geologic Hazards and Resources

Changing the configuration of the power block or raising the stack height would not create any additional impacts to geologic hazards and resources from those discussed in the AFC. All of the structures will be designed to meet seismic standards for the area.

3.16 Paleontological Resources

Changing the location of the STG and CTG within the power block or raising the stack height would have no effect on Paleontological resource issues from those discussed in the AFC.

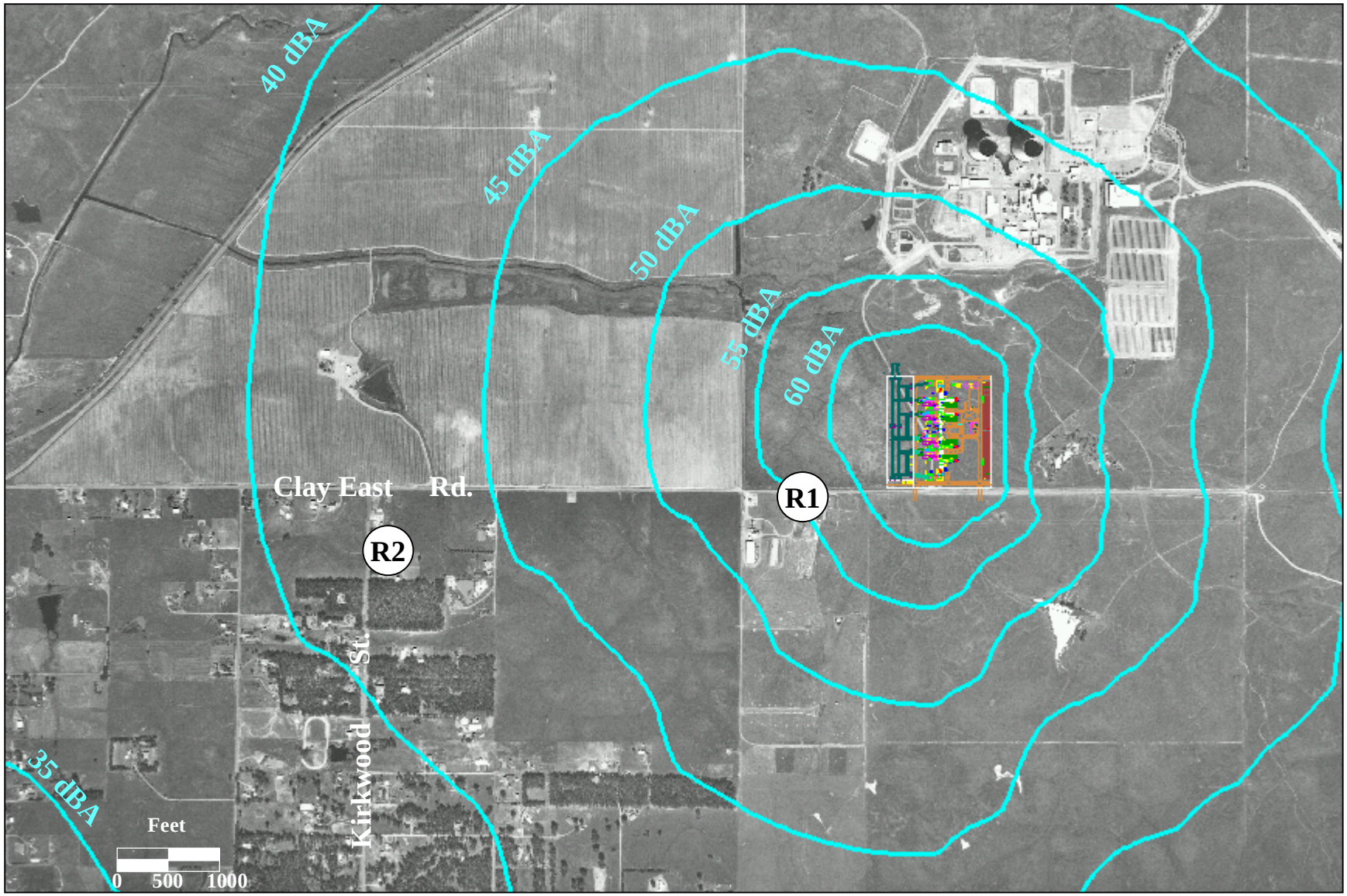

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FIGURE 8.5-2R
Proposed Consumnes Power Plant
Expected Plant Noise Emission Contours
During Normal Base Load Operation

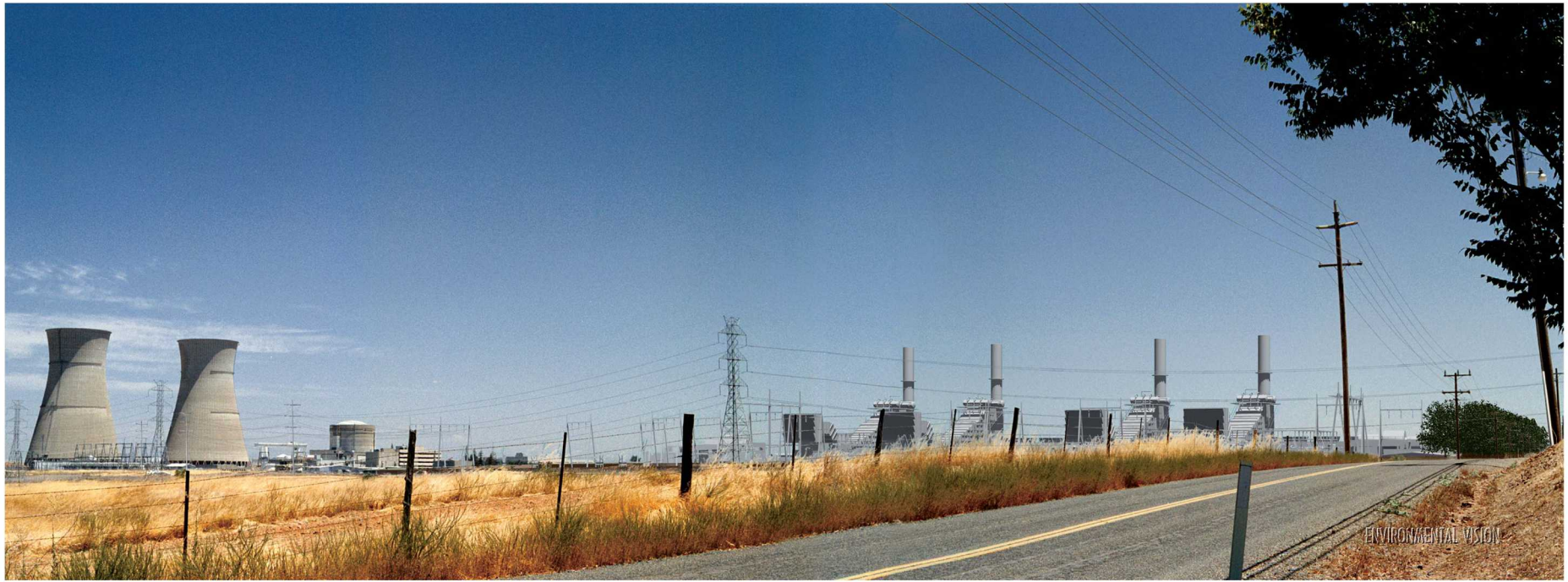


FIGURE 8.11-2bR
KOP 1: SIMULATED VIEW OF PROJECT
COSUMNES POWER PLANT
APPLICATION FOR CERTIFICATION

ENVIRONMENTAL VISION

SMUD CRP E012002004SAC022502

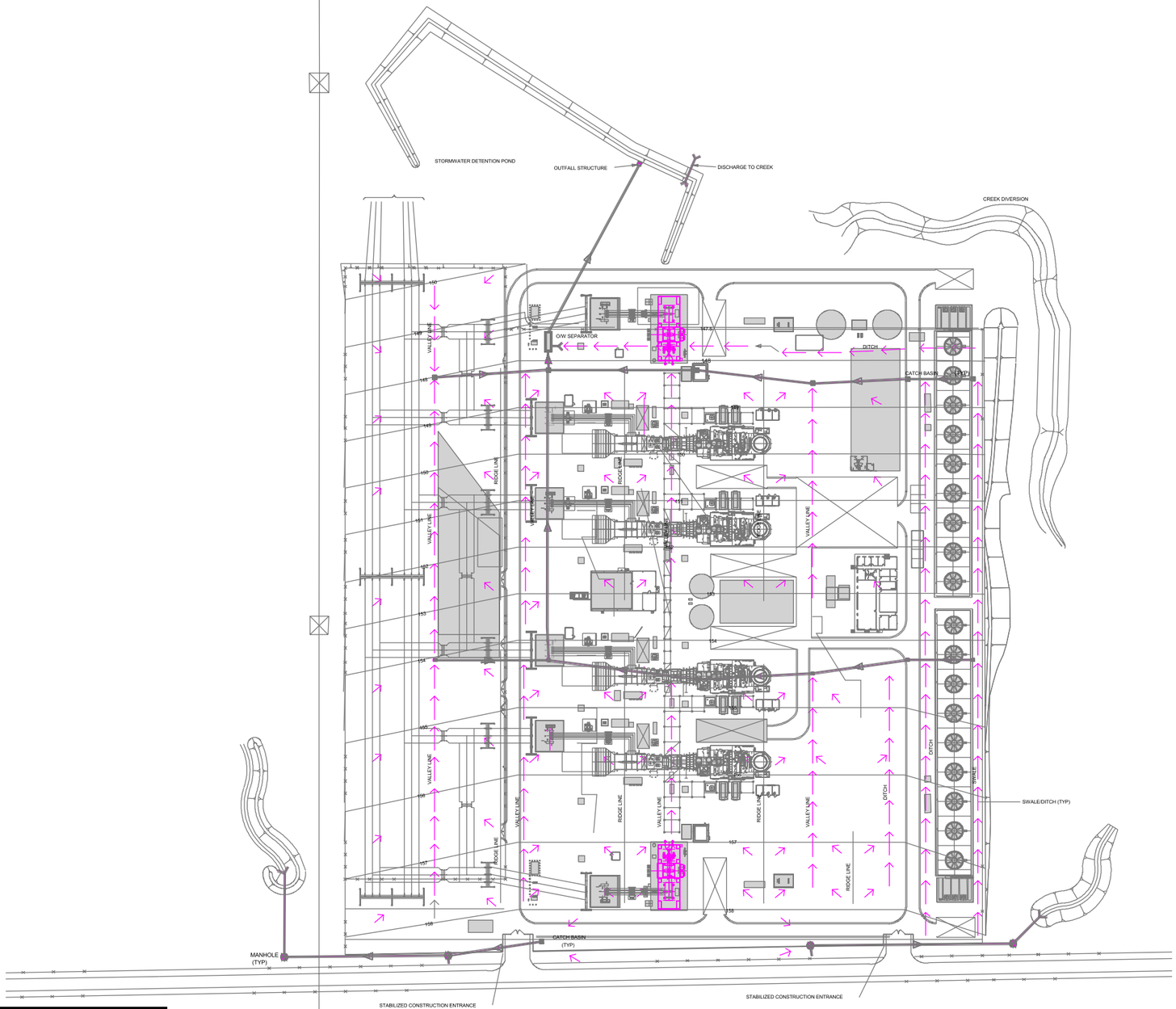
CH2MHILL

ENVIRONMENTAL VISION

SMUD CRP E012002004SAC022502

FIGURE 8.11-3bR
KOP 2: SIMULATED VIEW OF PROJECT
COSUMNES POWER PLANT
APPLICATION FOR CERTIFICATION

CH2MHILL



GENERAL NOTES

1. CREEK DIVERSION, DETENTION POND AND STABILIZED CONSTUCTION ENTRANCES SHALL BE CONSTRUCTED PRIOR TO THE COMMENCEMENT OF GRADING ACTIVITIES AND SHALL BE MAINTAINED THROUGHOUT THE COURSE OF THE PROJECT.

   CREEK DIVERSION AND DETENTION POND EMBANKMENTS SHALL BE SEEDED. ALL OTHER EMBANKMENTS SHALL BE PROTECTED DURING CONSTRUCTION WITH FILTER FABRIC ON SLOPE.

3. DETENTION POND SHALL BE USED AS A TEMPORARY SEDIMENT BASIN DURING CONSTRUCTION.

4. STABILIZED CONSTRUCTION ENTRANCES SHALL BE A MINIMUM OF 20 FEET WIDE, 50 FEET LONG AND SHALL CONSIST OF A 6-INCH THICK MINIMUM LAYER OF 2-INCH ANGULAR CRUSHED AGGREGATE COMPACTED IN PLACE, UNDERLAIN WITH A GEOTEXTILE FILTER FABRIC.

5. THE ROADS ADJACENT TO THE SITE SHALL BE KEPT FREE OF DIRT, MUD AND DEBRIS.

6. WHEN WASHING OF WHEELS IS REQUIRED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY, IT SHALL BE DONE ON AN AREA STABILIZED WITH AGGREGATE/ROCK AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.

7. TOPSOIL STOCKPILES SHALL BE LOCATED TO AVOID EROSION OF SAID STOCKPILES ONTO OFFSITE AREAS. STOCKPILES TO REMAIN LONGER THAN TWELVE MONTHS SHALL BE SEEDED.

8. DRAWING SHOWS INITIAL DIVERSION DITCHES/SWALES AROUND SITE PERIMETER TO PREVENT/INTERCEPT STORMWATER RUNOFF TO OFFSITE AREAS. DITCHES/SWALES SHALL BE RELOCATED AS REQUIRED DURING THE DIFFERENT STAGES OF CONSTRUCTION.

9. INSPECTION AND MAINTENANCE OF ALL EROSION CONTROL FEATURES SHALL BE CONDUCTED PERIODICALLY AS WELL AS AFTER EACH RAIN.

NO	REVISIONS	DATE	BY	CHK	DSNR	APPR
A	ISSUED FOR APPROVAL	3/19/02	JEH			

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UTILITY ENGINEERING

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AMARILLO, TEXAS GROTON, CONNECTICUT DENVER, COLORADO

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
The Power To Do More

COSUMNES POWER PLANT

DRAWN	DESIGNED	CHECKED	
APPROVED	CADD DRAWING NUMBER	SHEET	REV
APPROVED			

N

150 0 150 Feet

SCALE IS APPROXIMATE

FIGURE 8.14-4R GRADING AND DRAINAGE PLAN

COSUMNES POWER PLANT
APPLICATION FOR CERTIFICATION

CH2MHILL

CH2M Hill RDD ArcView Project File \\Thor\Cart1\rddgis\Rancho_seco\rancho_seco_cad.apr 9:17 a.m. 03-14-2002

APPENDIX 8.1D (REVISED)

Modeling Analysis

Table 8.1D-2R
Results of the Turbine Screening Analysis
SMUD Cosumnes Power Plant
rev 2/21/02

Screening Modeling Results (ug/m3 per 4.0 g/s)					
	1985-89 Met Data				
	1-hr	3-hr	8-hr	24-hr	annual
1	8.007	4.779	4.108	1.590	0.100
2	14.010	9.255	6.321	3.969	0.187
3	7.836	4.769	4.081	1.575	0.100
4	13.483	8.851	6.066	3.664	0.175
5	7.588	4.733	4.021	1.545	0.099
6	13.326	8.728	6.029	3.591	0.173

Turbine Emission Rates for Screening Modeling (g/s)										
	NOx		SO2				CO		PM10	
Turbine Case	1-hr	annual avg	1-hr	3-hr	24-hr	annual avg	1-hr	8-hr	24-hr	annual avg
1	1.951	1.561	0.151	0.151	0.151	0.151	2.850	2.850	1.134	1.134
2	1.159	0.927	0.089	0.089	0.089	0.089	1.694	1.694	1.134	1.134
3	2.041	1.633	0.157	0.157	0.157	0.157	2.982	2.982	1.134	1.134
4	1.298	1.039	0.101	0.101	0.101	0.101	1.897	1.897	1.134	1.134
5	2.128	1.702	0.165	0.165	0.165	0.165	3.110	3.110	1.134	1.134
6	1.358	1.086	0.105	0.105	0.105	0.105	1.984	1.984	1.134	1.134

Turbine Case	Load	Modeled Impacts, ug/m3, by Pollutant and Averaging Period									
		NOx		SO2				CO		PM10	
		1-hr	Annual	1-hr	3-hr	24-hr	Annual	1-hr	8-hr	24-hr	Annual
1	100	15.62	0.156	1.209	0.722	0.240	0.0151	22.82	11.71	1.80	0.113
2	50	16.24	0.173	1.247	0.824	0.353	0.0166	23.73	10.71	**4.50**	**0.212**
3	100	15.99	0.162	1.230	0.749	0.247	0.0156	23.37	12.17	1.79	0.113
4	50	17.50	0.181	1.362	0.894	0.370	0.0176	25.58	11.51	4.15	0.198
5	100	16.15	0.168	1.252	0.781	0.255	0.0163	23.60	**12.51**	1.75	0.112
6	50	**18.10**	**0.188**	**1.399**	**0.916**	**0.377**	**0.0181**	**26.44**	11.96	4.07	0.196

Table 8.1D-4R
Fumigation Screening Analysis
Rev. 2/24/02

Emission Rates for Unit Impacts Analysis (g/sec per stack)						
TURBINES	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
NOx	1.95	1.16	2.04	1.30	2.13	1.36
SO2	0.15	0.09	0.16	0.10	0.17	0.10
CO	2.85	1.69	2.98	1.90	3.11	1.98
PM10	1.13	1.13	1.13	1.13	1.13	1.13

Modeled Maximum 1-Hr Avg Cavity Concs (ug/m3)						
	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
ug/m3 for 1 g/s/stack	1.218	1.874	1.215	1.853	1.202	1.844
NOx (ug/m3)	2.376	2.172	2.479	2.406	2.558	2.504
SO2 (ug/m3)	0.184	0.167	0.191	0.187	0.199	0.193
CO (ug/m3)	3.472	3.174	3.623	3.515	3.738	3.659
PM10 (ug/m3)	1.381	2.125	1.378	2.101	1.363	2.091
Dist. To Max. (m)	16,281	11,830	16,314	11,929	16,440	11,972

Modeled Simple Terrain 1-Hr Avg. Concs (ug/m3)						
	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
ug/m3 for 1 g/s/stack	1.078	2.016	1.073	1.984	1.056	1.97
NOx (ug/m3)	2.103	2.337	2.190	2.576	2.247	2.675
SO2 (ug/m3)	0.163	0.179	0.169	0.200	0.175	0.207
CO (ug/m3)	3.073	3.414	3.199	3.764	3.284	3.909
PM10 (ug/m3)	1.222	2.286	1.217	2.250	1.198	2.234
Max.Impact Dist (m)	1,155	953	1,157	958	1,162	960
		(a)		(a)		(a)
(a) Maximum simple terrain impacts exceed fumigation impacts so simple terrain concentrations are conservative and controlling.						

Max. Modeled Fumigation 1-Hr Avg. Concs (ug/m3)						
	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
NOx (ug/m3)	2.376	2.337	2.479	2.576	2.558	2.675
SO2(ug/m3)	0.184	0.179	0.191	0.200	0.199	0.207
CO (ug/m3)	3.472	3.414	3.623	3.764	3.738	3.909
Max. Modeled Fumigation 3-Hr Avg. Concs (ug/m3)						
	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
SO2(ug/m3)	0.156	0.161	0.162	0.180	0.168	0.186
Max. Modeled Fumigation 8-Hr Avg. Concs (ug/m3)						
	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
CO (ug/m3)	2.203	2.390	2.295	2.635	2.358	2.736
Max. Modeled Fumigation 24-Hr Avg. Concs (ug/m3)						
	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
SO2(ug/m3)	0.066	0.072	0.068	0.080	0.070	0.083
PM10 (ug/m3)	0.493	0.914	0.491	0.900	0.483	0.894

APPENDIX 8.1E (REVISED)

Screening Health Risk Assessment

Table 8.1E-1R
Screening Health Risk Assessment
SMUD Cosumnes Power Plant

Acute Inhalation Hazard Index

Pollutant Name	Max. Modeled 1-hr Conc, ug/m3		Acute REL, ug/m3 (1)	Toxicological Endpoints	Acute Inhalation Hazard Index	
	Combustion Sources	Cooling Tower			Combustion Sources	Cooling Tower
Acrolein	1.14E-02		1.90E-01	Eye irritation	5.97E-02	
Ammonia	4.20E+01		3.20E+03	Eye and respiratory irritation	1.31E-02	
Arsenic		3.89E-03	1.90E-01	Reproductive/ Developmental		2.05E-02
Benzene	1.03E-02		1.30E+03	Reproductive/ Developmental	7.88E-06	
Copper		1.81E-03	1.00E+02	Respiratory Irritation		1.81E-05
Formaldehyde	6.33E-01		9.40E+01	Eye irritation	6.73E-03	
Propylene oxide	9.11E-02		3.10E+03	Eye and respiratory irritation	2.94E-05	
Toluene	4.09E-01		3.70E+04	CNS (mild); Eye and respiratory irritation	1.11E-05	
Xylenes	2.01E-01		2.20E+04	Eye and respiratory irritation	9.13E-06	
Total Acute Hazard Index					**0.100**	

Table 8.1E-2R
Screening Health Risk Assessment
SMUD Cosumnes Power Plant

Chronic Inhalation Hazard Index

	Pathway (1)							
	Resp	CV/BL	CNS	Skin	Repro	Kidn	GI/LV	Immun
Cooling Tower	<.0001	0.0009	0.0009	<.0001	0.0009	0	0	--
Gas Turbines/Aux. Boiler	0.0074	<.0001	0.0001	0.0046	<.0001	<.0001	<.0001	--
Total Chronic	0.0074	0.0009	0.0010	0.0046	0.0009	<.0001	<.0001	--
Total, All Pathways	**0.0148**							

Notes:
(1) Resp: respiratory; CV/BL: cardiovascular/blood; CNS: central nervous system; Repro: reproductive system; Kidn: renal system; GI/LV: gastrointestinal/liver; Immun: immunological system

Table 8.1E-3R
Screening Health Risk Assessment
SMUD Cosumnes Power Plant

Individual Cancer Risk

	Air	Soil	Skin	Garden	Mmilk	Other	Total by Source
Gas Turbines	5.98E-08	1.96E-09	1.07E-09	0.00E+00	0.00E+00	0.00E+00	6.28E-08
Cooling Tower	8.82E-08	1.04E-07	2.21E-09	0.00E+00	0.00E+00	0.00E+00	1.94E-07
Total by Route	1.48E-07	1.06E-07	3.28E-09	0.00E+00	0.00E+00	0.00E+00	--
TOTAL RISK	**0.26**	**in one million**					

California Air Resources Board

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Health Risk Assessment Program

Version 2.0e

CHRONIC INHALATION EXPOSURE REPORT

Run Made By

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Sierra Research

Project : SMUD CPP

Feb. 24, 2002

Pollutant Database Date : Oct. 31, 2000
Database Reference..... : CAPCOA Risk Assessment Guidelines

DILUTION FACTOR FOR POINT UNDER EVALUATION

X/Q (ug/m3)/(g/s) : 1.00E+00

ANNUAL AVERAGE EMISSION RATE INFORMATION

File: ANNAVG.E96

Pollutant Name	Emission Rate (g/s)
1,3-BUTADIENE	1.554E-05
ACETALDEHYDE	1.444E-03
ACROLEIN	1.306E-04
AMMONIA	5.074E-01
ARSENIC AND COMPOUNDS (INOR	2.673E-05
BENZENE	1.179E-04
COPPER AND COMPOUNDS	1.246E-05
ETHYL BENZENE	1.154E-03
FORMALDEHYDE	7.278E-03
LEAD AND COMPOUNDS	1.835E-06
MANGANESE AND COMPOUNDS	1.442E-05
N-HEXANE	9.169E-03
NAPHTHALENE	4.708E-05
PAH:BENZ(A)ANTHRACENE	8.001E-07
PAH:BENZO(A)PYRENE	4.921E-07
PAH:BENZO(B)FLUORANTHENE	4.000E-07
PAH:BENZO(K)FLUORANTHENE	3.894E-07
PAH:CHRYSENE	8.921E-07
PAH:DIBENZ(A,H)ANTHRACENE	8.319E-07
PAH:INDENO(1,2,3-C,D)PYRENE	8.319E-07
PROPYLENE (PROPENE)	2.729E-02
PROPYLENE OXIDE	1.048E-03
TOLUENE	4.708E-03
XYLENES	2.312E-03
ZINC COMPOUNDS	2.819E-05

CHRONIC INHALATION HAZARD INDEX

Pollutant	Resp	CV/BL	CNS	Skin	Repro	Kidn	GI/LV	Immun
1,3-BUTADIENE	--	--	--	--	<.0001	--	--	--
ACETALDEHYDE	0.0002	--	--	--	--	--	--	--
ACROLEIN	0.0022	--	--	0.0022	--	--	--	--
AMMONIA	0.0025	--	--	--	--	--	--	--
ARSENIC AND COM	--	0.0009	0.0009	--	0.0009	--	--	--
BENZENE	--	<.0001	<.0001	--	<.0001	--	--	--
COPPER AND COMP	<.0001	--	--	--	--	--	--	--
ETHYL BENZENE	--	--	--	--	<.0001	<.0001	<.0001	--
FORMALDEHYDE	0.0024	--	--	0.0024	--	--	--	--
MANGANESE AND C	--	--	<.0001	--	--	--	--	--
N-HEXANE	--	--	<.0001	--	--	--	--	--
NAPHTHALENE	<.0001	--	--	--	--	--	--	--
PROPYLENE (PROP	<.0001	--	--	--	--	--	--	--
PROPYLENE OXIDE	<.0001	--	--	--	--	--	--	--
TOLUENE	<.0001	--	<.0001	--	<.0001	--	--	--
XYLENES	<.0001	--	<.0001	--	--	--	--	--
ZINC COMPOUNDS	<.0001	<.0001	--	--	--	--	--	--
Total Chronic	0.0074	0.0009	0.0010	0.0046	0.0009	<.0001	<.0001	--

A Zero Background Concentration file was used
to perform this analysis, therefore, there is
no contribution from background pollutants.

California Air Resources Board

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Office of Environmental Health Hazard Assessment

Health Risk Assessment Program

Version 2.0e

CHRONIC NONINHALATION EXPOSURE REPORT

Run Made By

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Sierra Research

Project : SMUD CPP

Feb. 24, 2002

Pollutant Database Date : Oct. 31, 2000
Database Reference..... : CAPCOA Risk Assessment Guidelines

DILUTION FACTOR FOR POINT UNDER EVALUATION

X/Q (ug/m3)/(g/s) : 1.00E+00

ANNUAL AVERAGE EMISSION RATE INFORMATION

File: ANNAVG.E96

Pollutant Name	Emission Rate (g/s)
1,3-BUTADIENE	1.554E-05
ACETALDEHYDE	1.444E-03
ACROLEIN	1.306E-04
AMMONIA	5.074E-01
ARSENIC AND COMPOUNDS (INOR	2.673E-05
BENZENE	1.179E-04
COPPER AND COMPOUNDS	1.246E-05
ETHYL BENZENE	1.154E-03
FORMALDEHYDE	7.278E-03
LEAD AND COMPOUNDS	1.835E-06
MANGANESE AND COMPOUNDS	1.442E-05
N-HEXANE	9.169E-03
NAPHTHALENE	4.708E-05
PAH:BENZ(A)ANTHRACENE	8.001E-07
PAH:BENZO(A)PYRENE	4.921E-07
PAH:BENZO(B)FLUORANTHENE	4.000E-07
PAH:BENZO(K)FLUORANTHENE	3.894E-07
PAH:CHRYSENE	8.921E-07
PAH:DIBENZ(A,H)ANTHRACENE	8.319E-07
PAH:INDENO(1,2,3-C,D)PYRENE	8.319E-07
PROPYLENE (PROPENE)	2.729E-02
PROPYLENE OXIDE	1.048E-03
TOLUENE	4.708E-03
XYLENES	2.312E-03
ZINC COMPOUNDS	2.819E-05

EXPOSURE ROUTE INFORMATION

File: EXPOSURE.I96

Deposition Velocity (m/s) .....: 0.020

Fraction of Homegrown Produce .: 0.000

Dilution Factor for Farm/Ranch X/Q (ug/m3)/(g/s) ....: 0.0000
Fraction of Animals' Diet From Grazing .....: 0.0000
Fraction of Animals' Diet From Impacted Feed .....: 0.0000

Fraction of Animals' Water Impacted by Deposition ...: 0.0000

  Surface Area (m2) ....: 0.000E+00
  Volume (liters) .....: 0.000E+00
  Volume Changes .....: 0.000E+00

Fraction of Meat in Diet Impacted ..: 0.0000

  Beef .....: 0.0000
  Pork .....: 0.0000
  Lamb/Goat .....: 0.0000
  Chicken .....: 0.0000

Fraction of Milk in Diet Impacted ..: 0.0000

  Goat Milk Fraction ..: 0.0000

Fraction of Eggs in Diet Impacted ..: 0.0000

Fraction of Impacted Drinking Water : 0.0000

  X/Q at water source ..: 0.0000
  Surface Area (m2) ....: 0.000E+00
  Volume (liters) .....: 0.000E+00
  Volume changes .....: 0.000E+00

Fraction of Fish from Impacted Water: 0.0000

  X/Q at Fish Source ...: 0.0000
  Surface Area (m2) ....: 0.000E+00
  Volume (liters) .....: 0.000E+00
  Volume changes .....: 0.000E+00

CHRONIC NONINHALATION EXPOSURE

Pollutant	Avg. Dose (mg/kg-d)	REL (mg/kg-d)	Avg Dose/REL
1,3-BUTADIENE	---	---	---
ACETALDEHYDE	---	---	---
ACROLEIN	---	---	---
AMMONIA	---	---	---
ARSENIC AND COMPOUNDS (I	7.10E-08	3.00E-04	2.37E-04
BENZENE	---	---	---
COPPER AND COMPOUNDS	---	---	---
ETHYL BENZENE	---	---	---
FORMALDEHYDE	---	---	---
LEAD AND COMPOUNDS	4.88E-09	---	---
MANGANESE AND COMPOUNDS	---	---	---
N-HEXANE	---	---	---
NAPHTHALENE	2.01E-08	---	---
PAH:BENZ(A)ANTHRACENE	1.80E-10	---	---
PAH:BENZO(A)PYRENE	1.10E-10	---	---
PAH:BENZO(B)FLUORANTHENE	8.98E-11	---	---
PAH:BENZO(K)FLUORANTHENE	8.74E-11	---	---
PAH:CHRYSENE	2.00E-10	---	---
PAH:DIBENZ(A,H)ANTHRACEN	1.87E-10	---	---
PAH:INDENO(1,2,3-C,D)PYR	1.87E-10	---	---
PROPYLENE (PROPENE)	---	---	---
PROPYLENE OXIDE	---	---	---
TOLUENE	---	---	---
XYLENES	---	---	---
ZINC COMPOUNDS	---	---	---

California Air Resources Board

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Health Risk Assessment Program

Version 2.0e

INDIVIDUAL CANCER RISK REPORT

Run Made By

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Sierra Research

Project : SMUD CPP

Feb. 24, 2002

Pollutant Database Date : Oct. 31, 2000
Database Reference..... : CAPCOA Risk Assessment Guidelines

DILUTION FACTOR FOR POINT UNDER EVALUATION

X/Q (ug/m3)/(g/s) : 1.00E+00

ANNUAL AVERAGE EMISSION RATE INFORMATION

File: ANNAVG.E96

Pollutant Name	Emission Rate (g/s)
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ACROLEIN	1.306E-04
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ARSENIC AND COMPOUNDS (INOR	2.673E-05
BENZENE	1.179E-04
COPPER AND COMPOUNDS	1.246E-05
ETHYL BENZENE	1.154E-03
FORMALDEHYDE	7.278E-03
LEAD AND COMPOUNDS	1.835E-06
MANGANESE AND COMPOUNDS	1.442E-05
N-HEXANE	9.169E-03
NAPHTHALENE	4.708E-05
PAH:BENZ(A)ANTHRACENE	8.001E-07
PAH:BENZO(A)PYRENE	4.921E-07
PAH:BENZO(B)FLUORANTHENE	4.000E-07
PAH:BENZO(K)FLUORANTHENE	3.894E-07
PAH:CHRYSENE	8.921E-07
PAH:DIBENZ(A,H)ANTHRACENE	8.319E-07
PAH:INDENO(1,2,3-C,D)PYRENE	8.319E-07
PROPYLENE (PROPENE)	2.729E-02
PROPYLENE OXIDE	1.048E-03
TOLUENE	4.708E-03
XYLENES	2.312E-03
ZINC COMPOUNDS	2.819E-05

EXPOSURE ROUTE INFORMATION

File: EXPOSURE.I96

Deposition Velocity (m/s) .....: 0.020

Fraction of Homegrown Produce .: 0.000

Dilution Factor for Farm/Ranch X/Q (ug/m3)/(g/s) ....: 0.0000
Fraction of Animals' Diet From Grazing .....: 0.0000
Fraction of Animals' Diet From Impacted Feed .....: 0.0000

Fraction of Animals' Water Impacted by Deposition ...: 0.0000

  Surface Area (m2) ....: 0.000E+00
  Volume (liters) .....: 0.000E+00
  Volume Changes .....: 0.000E+00

Fraction of Meat in Diet Impacted ..: 0.0000

  Beef .....: 0.0000
  Pork .....: 0.0000
  Lamb/Goat .....: 0.0000
  Chicken .....: 0.0000

Fraction of Milk in Diet Impacted ..: 0.0000

  Goat Milk Fraction ..: 0.0000

Fraction of Eggs in Diet Impacted ..: 0.0000

Fraction of Impacted Drinking Water : 0.0000

  X/Q at water source ..: 0.0000
  Surface Area (m2) ....: 0.000E+00
  Volume (liters) .....: 0.000E+00
  Volume changes .....: 0.000E+00

Fraction of Fish from Impacted Water: 0.0000

  X/Q at Fish Source ...: 0.0000
  Surface Area (m2) ....: 0.000E+00
  Volume (liters) .....: 0.000E+00
  Volume changes .....: 0.000E+00

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44 YEAR
INDIVIDUAL CANCER RISK BY POLLUTANT AND ROUTE

Pollutant	Air	Soil	Skin	Garden	MMilk	Other
1,3-BUTADIENE	1.66E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ACETALDEHYDE	2.45E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ARSENIC AND COM	5.54E-08	8.99E-08	1.90E-09	0.00E+00	0.00E+00	0.00E+00
BENZENE	2.15E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FORMALDEHYDE	2.74E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LEAD AND COMPOU	1.38E-11	3.50E-11	7.41E-13	0.00E+00	0.00E+00	0.00E+00
PAH:BENZ(A)ANTH	5.53E-11	8.52E-11	5.41E-11	0.00E+00	2.18E-10	0.00E+00
PAH:BENZO(A)PYR	3.40E-10	5.24E-10	3.33E-10	0.00E+00	1.34E-09	0.00E+00
PAH:BENZO(B)FLU	2.77E-11	4.26E-11	2.70E-11	0.00E+00	1.09E-10	0.00E+00
PAH:BENZO(K)FLU	2.69E-11	4.14E-11	2.63E-11	0.00E+00	1.06E-10	0.00E+00
PAH:CHRYSENE	6.17E-12	9.49E-12	6.03E-12	0.00E+00	2.43E-11	0.00E+00
PAH:DIBENZ(A,H)	6.27E-10	3.03E-10	1.92E-10	0.00E+00	7.75E-10	0.00E+00
PAH:INDENO(1,2,	5.75E-11	8.85E-11	5.62E-11	0.00E+00	2.27E-10	0.00E+00
PROPYLENE OXIDE	2.44E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Route Total	9.27E-08	9.11E-08	2.60E-09	0.00E+00	2.80E-09	0.00E+00

TOTAL RISK: 1.89E-07

70 YEAR
INDIVIDUAL CANCER RISK BY POLLUTANT AND ROUTE

Pollutant	Air	Soil	Skin	Garden	MMilk	Other
1,3-BUTADIENE	2.64E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ACETALDEHYDE	3.90E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ARSENIC AND COM	8.82E-08	1.04E-07	2.21E-09	0.00E+00	0.00E+00	0.00E+00
BENZENE	3.42E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FORMALDEHYDE	4.37E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LEAD AND COMPOU	2.20E-11	4.06E-11	8.59E-13	0.00E+00	0.00E+00	0.00E+00
PAH:BENZ(A)ANTH	8.80E-11	1.32E-10	8.37E-11	0.00E+00	0.00E+00	0.00E+00
PAH:BENZO(A)PYR	5.41E-10	8.11E-10	5.15E-10	0.00E+00	0.00E+00	0.00E+00
PAH:BENZO(B)FLU	4.40E-11	6.59E-11	4.18E-11	0.00E+00	0.00E+00	0.00E+00
PAH:BENZO(K)FLU	4.28E-11	6.41E-11	4.07E-11	0.00E+00	0.00E+00	0.00E+00
PAH:CHRYSENE	9.81E-12	1.47E-11	9.33E-12	0.00E+00	0.00E+00	0.00E+00
PAH:DIBENZ(A,H)	9.98E-10	4.68E-10	2.97E-10	0.00E+00	0.00E+00	0.00E+00
PAH:INDENO(1,2,	9.15E-11	1.37E-10	8.70E-11	0.00E+00	0.00E+00	0.00E+00
PROPYLENE OXIDE	3.88E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Route Total	1.48E-07	1.06E-07	3.28E-09	0.00E+00	0.00E+00	0.00E+00

TOTAL RISK: 2.57E-07