APPENDIX K
AIR QUALITY DATA AND MODELING PROTOCOL

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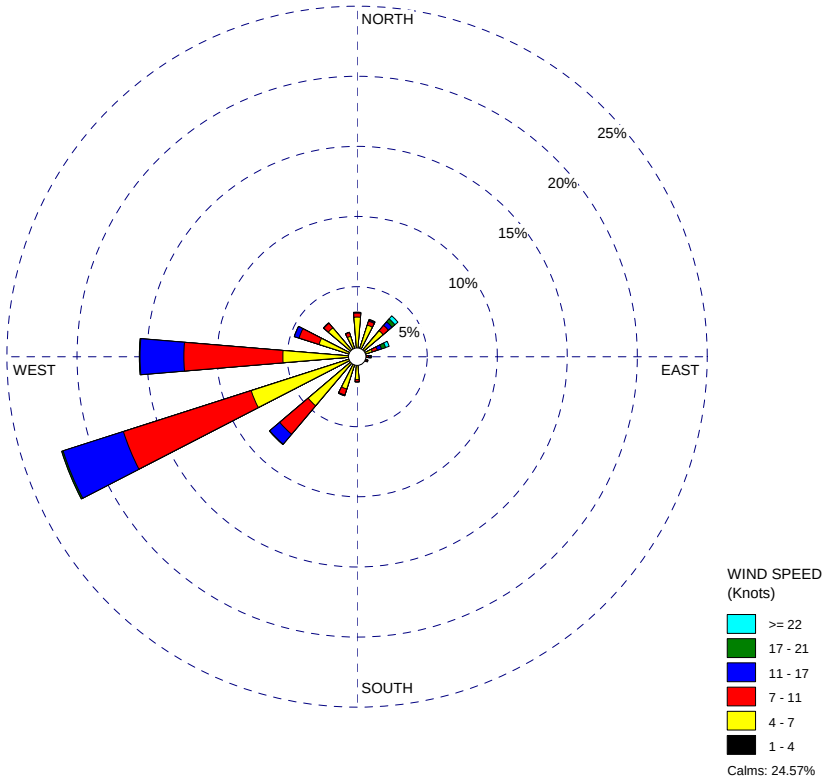
Appendix K-1
Seasonal Wind Roses

WIND ROSE PLOT:

Ontario International Airport

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	1994 1995 1997 1998 1999 **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **24.57%**	TOTAL COUNT: **43800 hrs.**	
	AVG. WIND SPEED: **5.50 Knots**	DATE: **1/18/2007**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

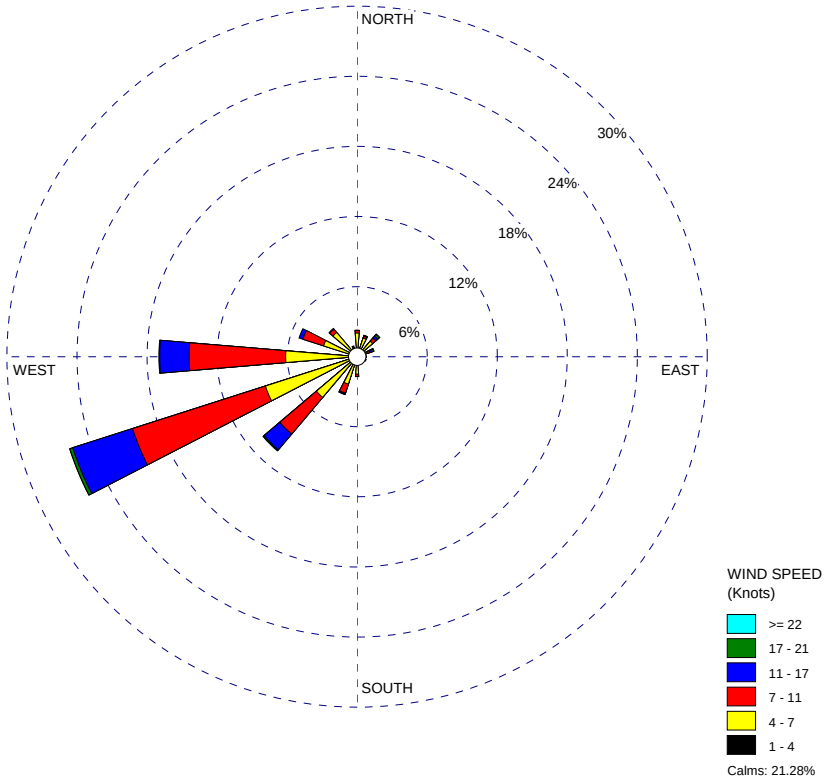
Annual Season Windrose for Ontario International Airport based on Surface Data for 1994, 1995, 1997, 1998 and 1999

WIND ROSE PLOT:

Ontario International Airport
1994-1999 Spring (Mar, Apr, May)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	1994 1995 1997 1998 1999 **Mar 1 - May 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **21.28%**	TOTAL COUNT: **11040 hrs.**	
	AVG. WIND SPEED: **5.82 Knots**	DATE: **1/18/2007**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

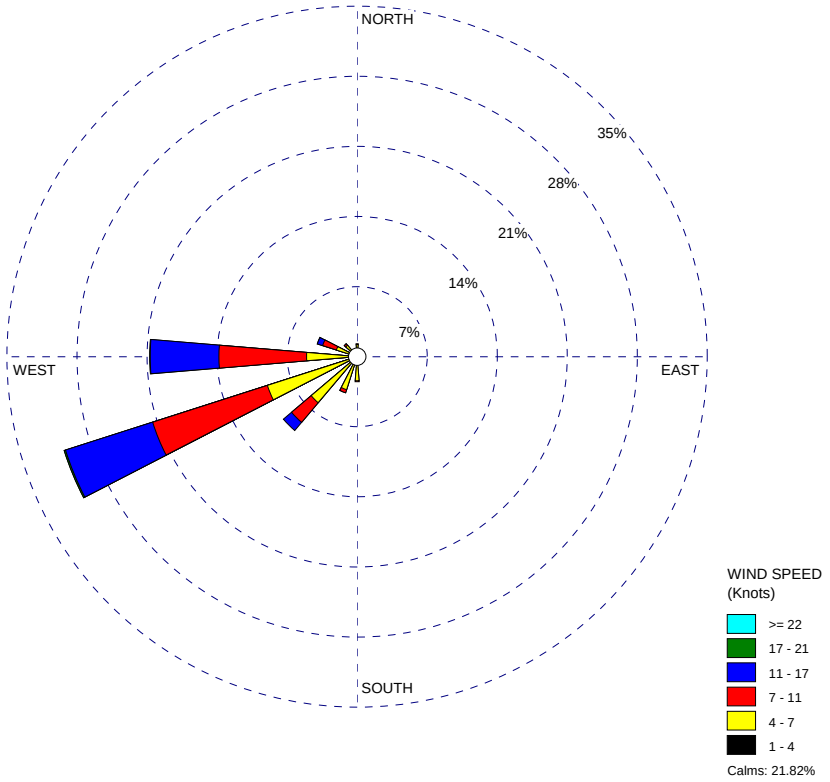
Spring Season Windrose for Ontario International Airport based on Surface Data for 1994, 1995, 1997, 1998 and 1999

WIND ROSE PLOT:

Ontario International Airport
1994-1999 Summer (Jun, Jul, Aug)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	1994 1995 1997 1998 1999 **Jun 1 - Aug 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **21.82%**	TOTAL COUNT: **11040 hrs.**	
	AVG. WIND SPEED: **6.08 Knots**	DATE: **1/18/2007**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

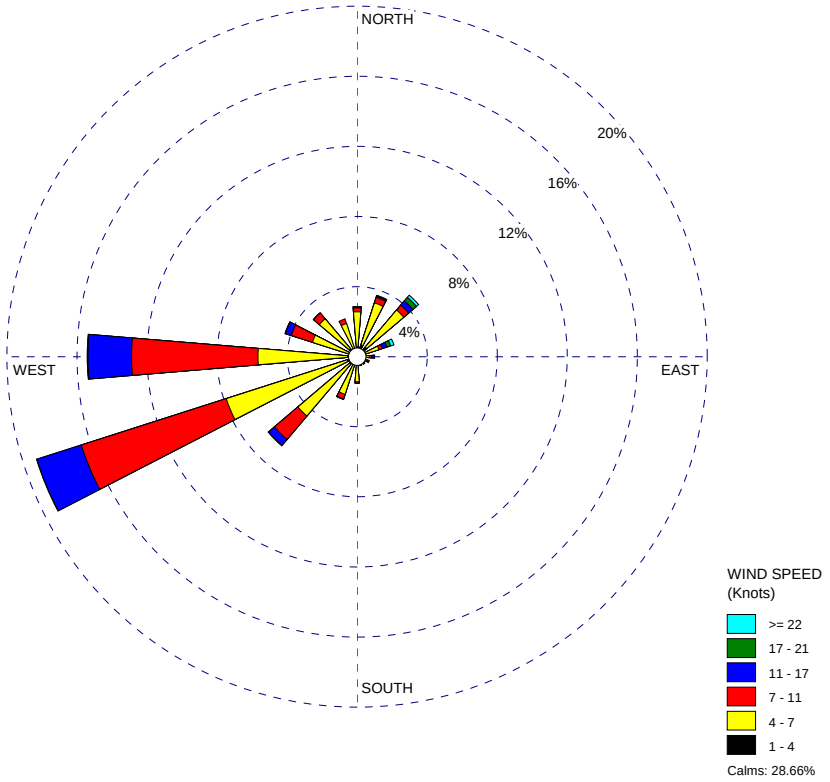
Summer Season Windrose for Ontario International Airport based on Surface Data for 1994, 1995, 1997, 1998 and 1999

WIND ROSE PLOT:

Ontario International Airport
1994-1999 Fall (Sep, Oct, Nov)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	1994 1995 1997 1998 1999 **Sep 1 - Nov 30** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **28.66%**	TOTAL COUNT: **10920 hrs.**	
	AVG. WIND SPEED: **4.84 Knots**	DATE: **1/18/2007**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

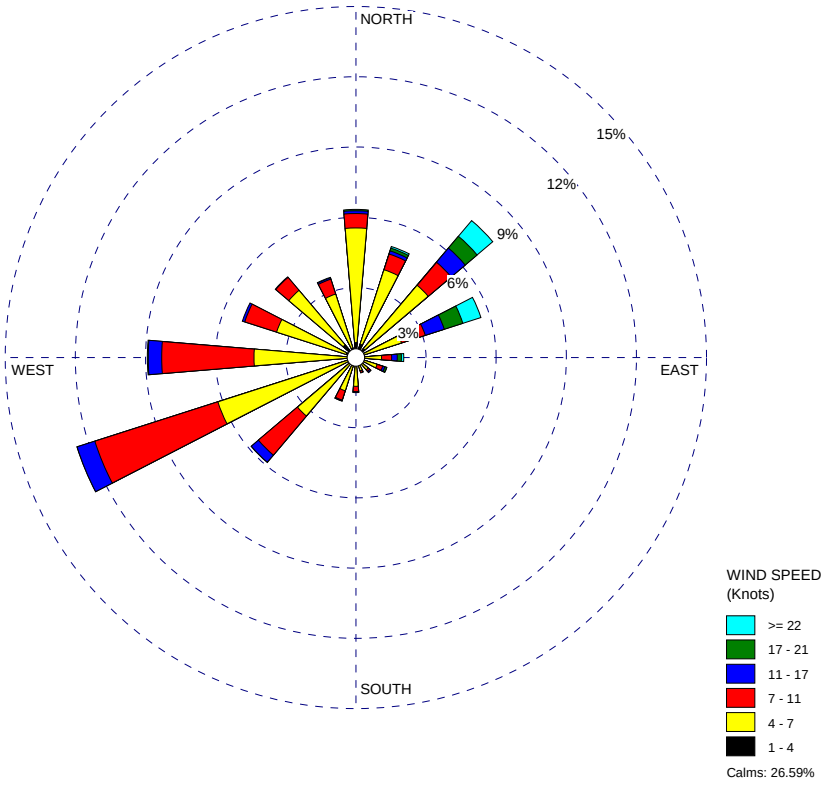
Fall Season Windrose for Ontario International Airport based on Surface Data for 1994, 1995, 1997, 1998 and 1999

WIND ROSE PLOT:

Ontario International Airport
1994-1999 Winter (Jan, Feb, and Dec)

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	1994 1995 1997 1998 1999 **Check Date Range Report** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **26.59%**	TOTAL COUNT: **10800 hrs.**	
	AVG. WIND SPEED: **5.23 Knots**	DATE: **1/18/2007**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Winter Season Windrose for Ontario International Airport based on Surface Data for 1994, 1995, 1997, 1998 and 1999

Appendix K-2
Construction Emissions

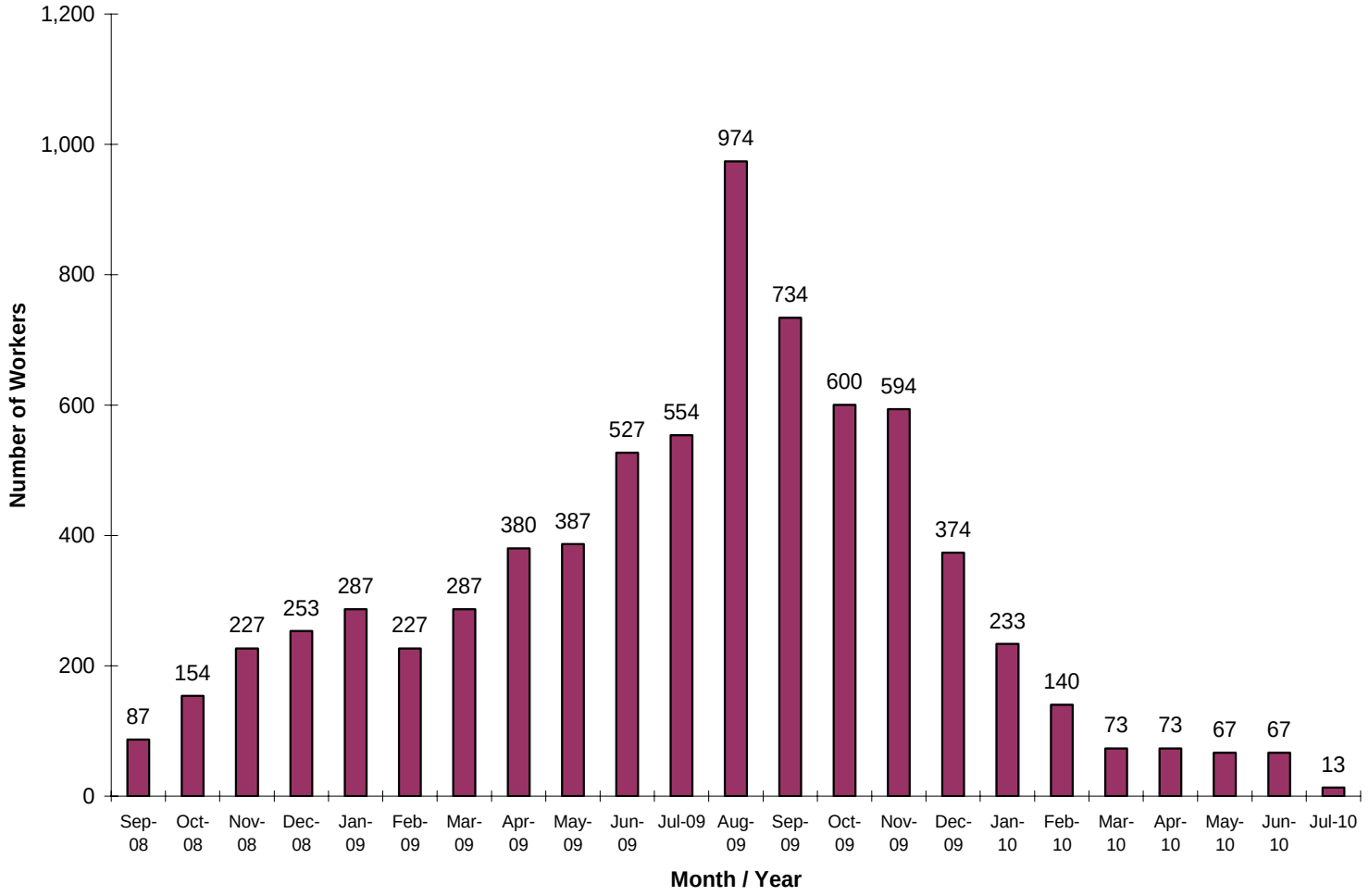
Daily Maximum Construction Emissions of Criteria Pollutants (lbs/day)						
Activity	**PM_{10}**	**$PM_{2.5}$**	**CO**	**ROC**	**NO_x**	**SO_x**
Onsite Combustion Emissions						
Diesel Construction Equipment	18.67	17.18	150.32	45.53	333.46	0.30
Dump trucks, pickup trucks and worker vehicles	0.10	0.08	1.84	0.23	1.06	0.002
Construction Combustion Subtotal (lbs)	***18.7***	***17.2***	***150.3***	***45.5***	***333.5***	***0.3***
Onsite Fugitive Dust Emissions						
Vehicle Travel on Unpaved Roads and Parking Lot	12.36	2.62				
Earth clearing/Bulldozing	9.24	1.92				
Earth Loading/Storage	0.47	0.10				
Subtotal of Offsite Emissions (lbs)	***22.1***	***4.6***				
Offsite On-Highway Emissions						
Worker Passenger Vehicle – Combustion Emissions	0.03	0.02	4.17	0.43	0.44	0.004
Worker Passenger Vehicle – Paved Road Dust	2.53	0.43				
Subtotal of Offsite Emissions (lbs)	***2.53***	***0.43***	***4.17***	***0.43***	***0.44***	***0.004***
Total Max. Daily Emissions (lbs)	**43.3**	**22.2**	**154.5**	**46.0**	**333.9**	**0.3**

Notes:
PM_{10} = particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter
ROC = reactive organic compounds
CO = carbon monoxide
NO_x = nitrogen oxide(s)
SO_x = sulfur oxide(s)

Maximum Annual Construction Emissions of Criteria Pollutants (ton/year)						
Activity	**PM_{10}**	**$PM_{2.5}$**	**CO**	**ROC**	**NO_x**	**SO_x**
Onsite Combustion Emissions						
Diesel Construction Equipment	1.46	1.35	11.71	3.62	24.88	0.02
Dump trucks, pickup trucks and worker vehicles	0.01	0.01	0.05	0.01	0.07	0.0001
Construction Combustion Subtotal (lbs)	***1.5***	***1.3***	***11.7***	***3.6***	***24.9***	***0.0***
Onsite Fugitive Dust Emissions						
Vehicle Travel on Unpaved Roads and Parking Lot	1.05	0.22				
Earth clearing/Bulldozing	4.80	1.00				
Earth Loading/Storage	0.05	0.01				
Subtotal of Offsite Emissions (lbs)	***5.9***	***1.2***				
Offsite On-Highway Emissions						
Worker Passenger Vehicle – Combustion Emissions	0.00	0.00	0.55	0.06	0.06	0.001
Worker Passenger Vehicle – Paved Road Dust	0.33	0.06				
Subtotal of Offsite Emissions (lbs)	***0.33***	***0.06***	***0.55***	***0.06***	***0.06***	***0.001***
Total Max. Daily Emissions (lbs)	**7.7**	**2.6**	**12.3**	**3.7**	**24.9**	**0.0**

Notes:
PM_{10} = particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in diameter
ROC = reactive organic compounds
CO = carbon monoxide
NO_x = nitrogen oxide(s)
SO_x = sulfur oxide(s)

Construction Staff by Month



Number of Workers by Month																						TOTAL ALL MONTHS	TOTAL MONTHS 1-12
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
87	154	227	253	287	227	287	380	387	527	554	974	734	600	594	374	233	140	73	73	67	67	7299	4344

Worker Commuting Emissions

Combustion EMISSION FACTOR FOR ONROAD VEHICLES

Onroad Vehicle	Fuel Type	Total Vehicle Count/ Year	Vehicle Count/ Constr Project	Weight (lbs)	Vehicle Type	EF (lbs/mile)					
						PM_{10}	$PM_{2.5}$	CO	VOC	NOx	SO_2
Passenger Vehicles	G/D	3475	5839	1000	LDA	8.51E-05	5.29E-05	1.05E-02	1.08E-03	1.10E-03	1.07E-05

EMISSION CALCULATION FOR ONROAD VEHICLES

	Total Days / Year	Total Days / Constr. Project	Daily VMT / Vehicle	Annual VMT	Constr Project Total VMT	Daily Emissions (lbs/day)					
						PM_{10}	$PM_{2.5}$	CO	VOC	NOx	SO_2
Highway Vehicles											
Passenger Vehicles	264	484	30	104256	175176	0.03	0.02	4.17	0.43	0.44	0.00

Annual Emission Rate (tons/year)						Total Project Emission Rate (tons)					
PM_{10}	$PM_{2.5}$	CO	VOC	NOx	SO_2	PM_{10}	$PM_{2.5}$	CO	VOC	NOx	SO_2
0.004	0.003	0.550	0.056	0.057	0.001	0.007	0.005	0.924	0.095	0.097	0.001

Emission Factors from
SCAQMD Prepared - Highest (Most Conservative) Emfac 2007 (version 2.3)
Emission Factors for On-Road Passenger Vehicles
Scenario Year: 2008
All model years in the range 1965 to 2008

Passenger vehicle travel on paved roads

0.0064 PM10 lb/VMT (from Table A9-9-B-1 for major streets/highways)

Equipment	Daily PM10 Emissions (lb/day)	Annual PM10 Emissions (tons/yr)	Constr Project PM10 Emissions (tons)	Daily PM2.5 Emissions (lb/day)	Annual PM2.5 Emissions (tons/yr)	Constr Project PM2.5 Emissions (tons)
Employee Vehicles	2.53	0.33	0.56	0.43	0.06	0.09

Assumed average distance travelled off site for all employees commuting will be 15 miles
times 2 for return trip 30 miles
Each worker on makes 1 return trip per day
7299 = Total number employees on site for entire 22 month construction period
4344 = Total number employees on site for months 1-12
based on AFC Table 3.6-1 - Construction Staff by Trade
Assumed 1.25 employees per vehicle
22 Maximum number of days per month of construction

Estimated Pieces of Construction Equipment and Schedules

	CONSTRUCTION EQUIPMENT	AVERAGE HOURS PER DAY	AVERAGE UNITS ON SITE PER MONTH																						TOTAL ALL MONTHS	TOTAL MONTHS 1-12
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
1	TRACKHOE EXCAVATOR	8		4	6	8	8	6	2																34	34
2	BACKHOE	8	1	3	3	3	3	3	3	1	1	1	1	1	1	1	1	1	1	1					30	24
3	BULLDOZER	6		4	6	8	8	6	4																40	36
4	FRONT END LOADER	8	4	4	4	4	4	4	4																28	28
5	BOBCAT	7	3	3	3	3	3	3	3																21	21
6	ROLLER COMPACTOR	6	2	2	4	4	6	6	6									1	1	1					33	30
7	PLATE COMPACTOR	6	4	4	4	4	6	6	6																34	34
8	CAISSON DRILLING RIG	8		1																					1	1
10	PAVING MACHINE	8															1	1	1						3	0
11	CONCRETE PUMP (DAILY RENTAL)	8		1	1	1	1	1	1	1	1	1	1												10	10
12	GROUT MIXER	3						1	1	1	1	1	1	1	1	1	1	1	1						12	7
13	ROUGH TERRAIN CRANE – 30 TON	8			1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1					21	15
14	ROUGH TERRAIN CRANE – 50 TON	8								1	1	1	1	1	1	1	1								8	5
15	TRUCK CRANE – 150 TON (DAILY RENTAL)	8						1	1	1	1	1	1	1	1	1	1	1	1						12	7
16	TRUCK CRANE – 350 TON (DAILY RENTAL)	8							1	2	1				1	1									6	4
17	CRAWLER CRANE – 150 TON	8		1	1																				2	2
18	TURBINE GANTRY	4								1	2	2	2	1	1										9	8
19	ROUGH TERRAIN FORKLIFT	6	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1				28	19
20	HEAVY DUTY FORKLIFT	6						1	1	1	1	1	1	1											7	7
21	MANLIFTS – 40’	8						2	2	3	3	3	3	2	2	2	2	2	1						27	18
22	MANLIFTS – 60’	8						1	1	1	2	3	3	2	2	1	1	1							18	13
23	MANLIFTS – 80’	8						1	1	1	2	3	3	2	2	1	1	1							18	13
24	AIR COMPRESSORS	8		1	1	1	1	2	2	3	3	3	3	3	2	1	1	1	1	1					30	23
25	WELDING MACHINES	8			2	2	2	4	8	12	12	12	12	6	4	4	4	2	2	2					90	72
26	WATER TRUCK	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						17	12
9	DUMP TRUCK	6	4	5	5	5	5	5	4																33	33
27	PICK-UP TRUCKS	3	11	11	11	11	15	15	15	15	15	13	13	13	11	9	9	9	9	9					214	158
	Equipment per Month		31	46	54	57	65	72	71	49	51	50	50	38	33	27	26	24	21	16	1	0	0	0		

Annual Combustion Emissions

Maximum annual construction equipment activity occurs in months 1 - 12.

Diesel Fired Offroad Equipment

					Emission factors (lb/hr)					Annual Emissions (ton/yr)					
Equipment	**Quantity/ year**	**Hours /Day**	**Horsepo wer**	**Days/ month**	**PM10**	**CO**	**ROC**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO**	**VOC**	**NOx**	**SOx**
Excavator	34	8	175	22	0.0748	0.6735	0.1674	1.2913	0.0013	0.2	0.2	2.0	0.5	3.9	0.0
Backhoe	24	8	120	22	0.0595	0.3703	0.1083	0.6510	0.0006	0.1	0.1	0.8	0.2	1.4	0.0
Tracked Dozer	36	6	375	22	0.1179	0.8463	0.3011	2.6790	0.0021	0.3	0.3	2.0	0.7	6.4	0.0
Wheeled Loader	28	8	175	22	0.0733	0.6383	0.1659	1.3029	0.0012	0.2	0.2	1.6	0.4	3.2	0.0
Bobcat	21	7	50	22	0.0259	0.2724	0.1007	0.2552	0.0003	0.0	0.0	0.4	0.2	0.4	0.0
Roller Compactor	30	6	175	22	0.0717	0.6345	0.1653	1.3433	0.0012	0.1	0.1	1.3	0.3	2.7	0.0
Plate Compactor	34	6	15	22	0.0021	0.0263	0.0052	0.0328	0.0001	0.0	0.0	0.1	0.0	0.1	0.0
Drill Rig	1	8	175	22	0.0585	0.7541	0.1203	1.1469	0.0016	0.0	0.0	0.1	0.0	0.1	0.0
Paving Machine	0	8	150	22	0.0924	0.5356	0.1823	1.0659	0.0008	0.0	0.0	0.0	0.0	0.0	0.0
Concrete Pump	10	8	25	22	0.0146	0.1221	0.0485	0.1954	0.0002	0.0	0.0	0.1	0.0	0.2	0.0
Grout Mixer	7	3	25	22	0.0125	0.1038	0.0402	0.1722	0.0002	0.0	0.0	0.0	0.0	0.0	0.0
Crane	15	8	75	22	0.0320	0.3359	0.1466	0.2624	0.0003	0.0	0.0	0.4	0.2	0.3	0.0
Crane	5	8	100	22	0.0664	0.3807	0.1261	0.7275	0.0006	0.0	0.0	0.2	0.1	0.3	0.0
Crane	7	8	250	22	0.0535	0.3881	0.1392	1.3867	0.0013	0.0	0.0	0.2	0.1	0.9	0.0
Crane	4	8	500	22	0.0771	0.7762	0.2012	1.9878	0.0018	0.0	0.0	0.3	0.1	0.7	0.0
Crane	2	8	250	22	0.0535	0.3881	0.1392	1.3867	0.0013	0.0	0.0	0.1	0.0	0.2	0.0
Crane - turbine gant	8	4	120	22	0.0664	0.3807	0.1261	0.7275	0.0006	0.0	0.0	0.1	0.0	0.3	0.0
Rough Terrain Fork	19	6	120	22	0.0757	0.4543	0.1404	0.8292	0.0007	0.1	0.1	0.6	0.2	1.0	0.0
Heavy Duty Forklift	7	6	120	22	0.0757	0.4543	0.1404	0.8292	0.0007	0.0	0.0	0.2	0.1	0.4	0.0
Aerial Lift	18	8	15	22	0.0048	0.0534	0.0113	0.0736	0.0001	0.0	0.0	0.1	0.0	0.1	0.0
Aerial Lift	13	8	25	22	0.0077	0.0644	0.0249	0.1073	0.0001	0.0	0.0	0.1	0.0	0.1	0.0
Aerial Lift	13	8	50	22	0.0203	0.2011	0.0833	0.2037	0.0003	0.0	0.0	0.2	0.1	0.2	0.0
Air Compressor	23	8	25	22	0.0108	0.0905	0.0359	0.1448	0.0002	0.0	0.0	0.2	0.1	0.3	0.0
Welder	72	8	25	22	0.0085	0.0707	0.0281	0.1131	0.0001	0.1	0.0	0.4	0.2	0.7	0.0
Water Truck	12	4	250	22	0.0659	0.4799	0.1822	1.8617	0.0019	0.0	0.0	0.3	0.1	1.0	0.0
	443								**Total**	**1.5**	**1.3**	**11.7**	**3.6**	**24.9**	**0.0**

Notes:

Emission factors from SCAQMD composite off-road emission factors from CARB's Off-Road Model for year 2008.

Equipment list, quantity, horsepower, and hours of operation from client.

PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions. PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for onroad or offroad diesel vehicles.

Combustion Exhaust from Travel on Unpaved Roads

Vehicle Type	Quantity/ year[1]	Round Trips /Day/ Unit	Round Trip Distance (mile)	Daily VMT per Unit	Annual VMT for all Units	Emission factor (lb/mile) PM10	PM2.5	CO	VOC	NOx	SOx	Emission factor vehicle type	Annual Emissions (ton/yr) PM10	PM2.5	CO	VOC	NOx	SOx
Dump trucks	33	4	1	4	2904	0.0042	0.0038	0.0136	0.0035	0.0446	4.14E-05	HHD truck	0.006	0.005	0.020	0.005	0.065	6.01E-05
Trucks - Pickup 3/4 ton	158	1	1	1	3476	8.51E-05	5.29E-05	0.0105	0.0011	0.0011	1.07E-05	passenger	0.000	0.000	0.018	0.002	0.002	1.87E-05
Worker's Vehicles in Parking lot	3475	1	0.75	0.75	2606	8.51E-05	5.29E-05	0.0105	0.0011	0.0011	1.07E-05	passenger	0.000	0.000	0.014	0.001	0.001	1.4E-05
												Total Unpaved Road	**0.006**	**0.006**	**0.052**	**0.008**	**0.068**	**9.27E-05**

Notes:

SCAQMD Prepared - Highest (Most Conservative) Emfac 2007 (version 2.3)

Emission Factors for On-Road Passenger Vehicles & Delivery Trucks & Heavy Heavy Duty Diesel Trucks

Scenario Year: 2008

All model years in the range 1965 to 2008

1. Truck quantity based on monthly maximums, worker vehicle quantity based on total vehicles per day per month

22 Maximum number of days per month of construction

Emission location	Activity	number of sources	MODEL EMISSION RATE per Source (lb/hr) NOx Annual	PM10 Annual	SO2 Annual	PM2.5 Annual	MODEL EMISSION RATE per Source (g/s) NOx Annual	PM10 Annual	SO2 Annual	PM2.5 Annual
Various	excavation	46	0.1235	0.0073	1.15E-04	0.0067	1.56E-02	9.16E-04	1.44E-05	8.43E-04
Roads	truck & worker travel	9	0.0017	0.00016	2.353E-06	0.00014	2.18E-04	2.02E-05	2.97E-07	1.79E-05

18 sources in main construction area
10 sources in laydown area B
5 sources in laydown area 1
5 sources in laydown area 9
8 sources in pipe excavation area

Annual Fugitive Dust Emissions

Maximum annual construction equipment activity occurs in months 1 - 12.

Bulldozing/Earth clearing

$E = 0.45 * G^{1.5} / H^{1.4} * 2.2046$ PM10 Emissions from bulldozing (lb/hr) from SCAQMD Table A9-9-F

7.5 G = Silt content (%) (from Table A9-9-F-1 for overburden)

15 H = Moisture content of surface material (%) (from Table A9-9-F-2 for moist dirt)

0.46 lb/hr of PM10

Equipment	Quantity/ year	Hours/ Day	Hours/ year/ Unit	Watering Control Efficiency	PM10 Emissions (tons/yr)	PM2.5 Emissions (tons/yr)
Excavator	34	8	1232	85%	1.44	0.30
Backhoe	24	8	1232	85%	1.02	0.21
Tracked Dozer	36	6	924	85%	1.15	0.24
Wheeled Loader	28	8	1232	85%	1.19	0.25
				Total	**4.80**	**1.00**

7 Total months of soil movement

22 construction days per month

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

Dirt Piling or Material Handling

$E = 0.00112 * (G/5)^{1.3} / (H/2)^{1.4}$ PM10 Emissions from Dirt Piling or Material Handling (lb/hr) from SCAQMD Table A9-9-G

12 G = Mean Wind speed (mph) default

15 H = Moisture content of surface material (%) (from Table A9-9-G-1 for moist dirt)

0.00021 lb/ton of PM10

annual fugitive dust

Equipment	Quantity/ year	Hours/ Day	Annual Material Handled (ton)	Watering Control Efficiency	PM10 Emissions (tons/yr)	PM2.5 Emissions (tons/yr)
Wheeled Loader	28	8	39,978	85%	0.0006	0.0001
Dump Trucks	33	6	39,978	85%	0.0006	0.0001
				Total	**0.0012**	**0.0003**

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

220 yd3/day 260 ton/day
33,880 yd3 39,978 tons 2360 density of soil (lb/yd3)
(USDA NRCS Physical Soil Properties from San Bernardino County
Western Part for Tujunga Sandy Loam soil)
14 acres = 33,880 cubic yds, assume depth of 0.5 yd (1.5 ft) of soils moved

Cover Storage Pile
SCAQMD Table A9-9-E
E = 1.7 * G/1.5 * (365-H)/235 * I/15 * J
PM10 Emission factor from wind erosion of storage piles per day per acre
7.5 G = Silt content (%) (from Table A9-9-E-1 for overburden)
34 H = Mean number of days per year with at least 0.01 inches of precipitation (from Western Regional Climate Center for Riverside Fire Station)
1.7 I = Percentage of time that the unobstructed wind speed exceeds 12 mph at mean pile height
0.5 J = Fraction of TSP that is PM10 = 0.5
0.678 lb/acre/day

wind speed percentage based on 1994-99 (5 yrs) of wind speed data (actual hours > 10 knots) as recorded at Ontario station

Source	Quantity	Size of Pile (acre)	Days / year	Watering Control Efficiency	PM10 Emissions (tons/yr)	PM2.5 Emissions (tons/yr)
Cover Storage Pile	3	1.5	210	85%	0.05	0.010

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants
pile size assumed
Days per year accounts for weekend days also, not just work days

annual fugitive dust

Travel on unpaved road

$F = 2.1 * G/12 * H/30 * (J/3)^{0.7} * (I/4)^{0.5} * (365-K)/365$ SCAQMD Table A9-9-D

Emission factor for vehicle travel on unpaved roads (lb/VMT)

12.5 G = Surface silt loading (%) (average value for Tujunga Loamy sand at site)

5 H = Mean vehicle speed (mph)

value listed in table I = Mean number of wheels on vehicle

value listed in table J = Mean vehicle weight (ton)

34 K = Mean number of days per year with at least 0.01 inches of precipitation (from Western Regional Climate Center for Riverside Fire Station)

Vehicle Type	Quantity/ year[1]	Round Trips /Day/ Unit	Round Trip Distance (mile)	Daily VMT per Unit	Annual VMT for all Units	Mean Vehicle Weight (tons)	Number of Wheels on Vehicle	PM10 EF (lbs/VMT)	Watering Control Efficiency	PM10 Emissions (tons/yr)	PM2.5 Emissions (tons/yr)
Bobcat	21	4	0.25	1	462	3	4	0.33	85%	0.011	0.002
Roller Compactor	30	4	0.25	1	660	11	4	0.82	85%	0.041	0.009
Plate Compactor	34	0	0	0	0	NA	NA	NA	85%	0.000	0.000
Drill Rig	1	0	0	0	0	NA	NA	NA	85%	0.000	0.000
Paving Machine	0	8	0.25	2	0	NA	NA	NA	85%	0.000	0.000
Concrete Pump	10	1	0.25	0.25	55	0.5	2	0.07	85%	0.000	0.000
Grout Mixer	7	0	0	0	0	NA	NA	NA	85%	0.000	0.000
Crane	15	1	0.25	0.25	82.5	15	6	1.25	85%	0.008	0.002
Crane	5	0	0	0	0	NA	NA	NA	85%	0.000	0.000
Crane	7	1	0.25	0.25	38.5	40	12	3.51	85%	0.010	0.002
Crane	4	0	0	0	0	NA	NA	NA	85%	0.000	0.000
Crane	2	0	0	0	0	NA	NA	NA	85%	0.000	0.000
Crane - turbine gantr	8	0	0	0	0	NA	NA	NA	85%	0.000	0.000
Rough Terrain Forklif	19	4	0.25	1	418	7	4	0.60	85%	0.019	0.004
Heavy Duty Forklift	7	4	0.25	1	154	7	4	0.60	85%	0.007	0.001
Aerial Lift	18	0	0	0	0	NA	NA	NA	85%	0.000	0.000
Aerial Lift	13	0	0	0	0	NA	NA	NA	85%	0.000	0.000
Aerial Lift	13	1	0.25	0.25	71.5	7	4	0.60	85%	0.003	0.001
Air Compressor	23	0	0	0	0	0.5	2	0.07	85%	0.000	0.000
Welder	72	0	0	0	0	0.5	2	0.07	85%	0.000	0.000
Water Truck	12	10	2	20	5280	13	10	1.46	85%	0.578	0.122
Dump Truck	33	4	1	4	2904	13	10	1.46	85%	0.318	0.067
Trucks - Pickup 3/4 ton	158	1	1	1	3476	1	4	0.15	85%	0.040	0.008
Worker's Vehicles in Parking lot	3475	1	0.75	0.75	2606	0.5	4	0.09	85%	0.018	0.004
									Total	**1.053**	**0.223**

annual fugitive dust

Assumed maximum travel speed is 5 mph
Equipment weight from SCAQMD Table A9-9-D-3
Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.
PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.
Round trips/day uses 1 trip per hour for dump trucks. Water trucks operate 2 times per hour. Service trucks use 1 trips per day.
Distances measured from plot plan from highway along access road to center of construction area and parking lot.
1. Truck quantity based on monthly maximums, worker vehicle quantity based on total vehicles per day per month

22 Maximum number of days per month of construction

		Total MODEL EMISSION RATE (lb/hr)	
		PM10	PM2.5
Emission location	**Activity**	**Annual**	**Annual**
Various	excavation	0.0113	0.0023
Roads	truck & worker travel	0.2404	0.0510

18 sources in main construction area B
10 sources in laydown area B
5 sources in laydown area 1
5 sources in laydown area 9
8 sources in pipe excavation area

					MODEL EMISSION RATE per Source (g/s-m2)	
					PM10	PM2.5
Location	**X (m)**	**Y (m)**	**AREA (m2)**	**percent of total area**	**Annual**	**Annual**
MAINDUST	325	174	56550	0.397	9.98E-09	2.08E-09
LAYDN1	255	95	24225	0.170	9.98E-09	2.08E-09
LAYDN9	100	35	3500	0.025	9.98E-09	2.08E-09
PIPEA	100	10	1000	0.007	9.98E-09	2.08E-09
PIPEB	100	10	1000	0.007	9.98E-09	2.08E-09
PIPEC	100	10	1000	0.007	9.98E-09	2.08E-09
PIPED	30	10	300	0.002	9.98E-09	2.08E-09
PIPEE	10	100	1000	0.007	9.98E-09	2.08E-09
PIPEF	10	30	300	0.002	9.98E-09	2.08E-09
PIPEG	100	10	1000	0.007	9.98E-09	2.08E-09
PIPEH	42	10	420	0.003	9.98E-09	2.08E-09
ALTB			52050	0.366	9.98E-09	2.08E-09

					annual fugitive dust	
Total Construction Area			142345			
Note 3 smaller areas make up AltB						
ALTB1	290	115	33350			
ALTB2	95	125	11875			
ALTB3	195	35	6825			
ROAD1	12	120	1440	0.118	1.16E-07	2.41E-08
ROAD2	12	120	1440	0.118	1.16E-07	2.41E-08
ROAD3	12	120	1440	0.118	1.16E-07	2.41E-08
ROAD4	12	120	1440	0.118	1.16E-07	2.41E-08
ROAD5	12	120	1440	0.118	1.16E-07	2.41E-08
ROAD6	12	60	720	0.059	1.16E-07	2.41E-08
ROAD7	120	12	1440	0.118	1.16E-07	2.41E-08
ROAD8	120	12	1440	0.118	1.16E-07	2.41E-08
ROAD9	120	12	1440	0.118	1.16E-07	2.41E-08
Total Road Area			12240			

Excavations and Foundations - Combustion Emissions

Maximum construction activity occurs in month 6.

Diesel Fired Offroad Equipment

Equipment	Quantity	Hours /Day	Horsepower	Emission factors (lb/hr) PM10	CO	ROC	NOx	SOx	Hourly Emissions (lb/hr) PM10	PM2.5	CO	VOC	NOx	SOx	Daily Emissions (lb/day) PM10	PM2.5	CO	VOC	NOx	SOx
Wheeled Loader	4	8	175	0.0733	0.6383	0.1659	1.3029	0.0012	0.29	0.27	2.55	0.66	5.21	0.00	2.35	2.16	20.43	5.31	41.69	0.04
Tracked Dozer	6	6	375	0.1179	0.8463	0.3011	2.6790	0.0021	0.71	0.65	5.08	1.81	16.07	0.01	4.24	3.90	30.47	10.84	96.44	0.07
Water Truck	1	6	250	0.0659	0.4799	0.1822	1.8617	0.0019	0.07	0.06	0.48	0.18	1.86	0.00	0.40	0.36	2.88	1.09	11.17	0.01
Roller Compactor	6	6	175	0.0717	0.6345	0.1653	1.3433	0.0012	0.43	0.40	3.81	0.99	8.06	0.01	2.58	2.37	22.84	5.95	48.36	0.04
Plate Compactor	6	6	15	0.0021	0.0263	0.0052	0.0328	0.0001	0.01	0.01	0.16	0.03	0.20	0.00	0.07	0.07	0.95	0.19	1.18	0.00
Bobcat	3	7	50	0.0259	0.2724	0.1007	0.2552	0.0003	0.08	0.07	0.82	0.30	0.77	0.00	0.54	0.50	5.72	2.12	5.36	0.01
Rough Terrain Forkl	3	6	120	0.0757	0.4543	0.1404	0.8292	0.0007	0.23	0.21	1.36	0.42	2.49	0.00	1.36	1.25	8.18	2.53	14.93	0.01
Air Compressor	2	8	25	0.0108	0.0905	0.0359	0.1448	0.0002	0.02	0.02	0.18	0.07	0.29	0.00	0.17	0.16	1.45	0.57	2.32	0.00
Welder	4	8	25	0.0085	0.0707	0.0281	0.1131	0.0001	0.03	0.03	0.28	0.11	0.45	0.00	0.27	0.25	2.26	0.90	3.62	0.00
Crane	2	8	250	0.0535	0.3881	0.1392	1.3867	0.0013	0.11	0.10	0.78	0.28	2.77	0.00	0.86	0.79	6.21	2.23	22.19	0.02
Concrete Pump	1	8	25	0.0146	0.1221	0.0485	0.1954	0.0002	0.01	0.01	0.12	0.05	0.20	0.00	0.12	0.11	0.98	0.39	1.56	0.00
Excavator	6	8	175	0.0748	0.6735	0.1674	1.2913	0.0013	0.45	0.41	4.04	1.00	7.75	0.01	3.59	3.30	32.33	8.03	61.98	0.06
Aerial Lift	4	8	50	0.0203	0.2011	0.0833	0.2037	0.0003	0.08	0.07	0.80	0.33	0.81	0.00	0.65	0.60	6.44	2.67	6.52	0.01
Grout Mixer	1	3	25	0.0125	0.1038	0.0402	0.1722	0.0002	0.01	0.01	0.10	0.04	0.17	0.00	0.04	0.03	0.31	0.12	0.52	0.00
Backhoe	3	8	120	0.0595	0.3703	0.1083	0.6510	0.0006	0.18	0.16	1.11	0.32	1.95	0.00	1.43	1.31	8.89	2.60	15.62	0.01
	52							**Total**	**2.71**	**2.50**	**21.68**	**6.61**	**49.06**	**0.044**	**18.67**	**17.18**	**150.32**	**45.53**	**333.46**	**0.30**

Notes:
Emission factors from SCAQMD composite off-road emission factors from CARB's Off-Road Model for year 2008.
Equipment list, quantity, horsepower, and hours of operation from client.
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions. PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for onroad or offroad diesel vehicles.
Construction day is assumed to be 10 hours long with a 1 hour lunch (7 am to 6 pm).

Combustion Exhaust from Travel on Unpaved Road

Vehicle Type	No. Of Unit	Round Trips /Day/ Unit[3]	Round Trip Distance (mile)	Daily VMT (all units)	Emission factor (lb/mile) PM10	PM2.5	CO	VOC	NOx	SOx	Emission factor vehicle type	Hourly Emissions (lb/hr) PM10	PM2.5	CO	VOC	NOx	SOx	Daily Emissions (lb/day) PM10	PM2.5	CO	VOC	NOx	SOx
Dump trucks	5	4	1	20	0.0041693	0.0038	0.0136	0.0035	0.0446	4E-05	HHD truc	0.0075806	0.006824	0.0248	0.0064	0.081054861	7.52E-05	0.083386	0.075059	0.272274	0.070316	0.891603	0.000827
Trucks - Pickup 3/4 ton	15	1	1	15	8.505E-05	5E-05	0.0105	0.0011	0.0011	1E-05	passeng	0.000116	7.22E-05	0.0144	0.0015	0.001503932	1.47E-05	0.001276	0.000794	0.158227	0.016188	0.016543	0.000161
Worker's Vehicles in Parking lot	178	1	0.75	133	8.505E-05	5E-05	0.0105	0.0011	0.0011	1E-05	passeng	0.0010299	0.000641	0.1277	0.0131	0.013354918	0.00013	0.011329	0.00705	1.405052	0.143749	0.146904	0.001432
											Total Unpaved Road	**0.0087265**	**0.007537**	**0.1669**	**0.0209**	**0.095913711**	**0.00022**	**0.095991**	**0.082903**	**1.835552**	**0.230252**	**1.055051**	**0.00242**

Notes:

SCAQMD Prepared - Highest (Most Conservative) Emfac 2007 (version 2.3)

Emission Factors for On-Road Passenger Vehicles & Delivery Trucks & Heavy Heavy Duty Diesel Trucks

Scenario Year: 2008

All model years in the range 1965 to 2008

Number of workers in month 6/1.25 people per car

Construction day is assumed to be 10 hours long with a 1 hour lunch (7 am to 6 pm).

11 Maximum number of construction work hours per day

Emission location	Activity	number of sources	MODEL EMISSION RATE per Source (lb/hr) NOx 1-hr	NOx Annual	CO 1 & 8 hr	PM10 24hr	PM10 Annual	SO2 1 & 3 hr	SO2 24hr	SO2 Annual	PM2.5 24hr	PM2.5 Annual	MODEL EMISSION RATE per Source (g/s) NOx 1-hr	NOx Annual	CO 1 & 8 hr	PM10 24hr	PM10 Annual	SO2 1 & 3 hr	SO2 24hr	SO2 Annual	PM2.5 24hr	PM2.5 Annual
Various	excavation	46	1.066	0.000	0.471	0.037		0.001	0.001		0.034		######		5.94E-02	4.65E-03		1.21E-04	7.57E-05		4.28E-03	0.00E+00
Roads	truck & worker travel	9	0.010657	0	0.0185	0.001		2E-05	2E-05		0.000837		######		2.34E-03	1.22E-04		3.08E-06	3.08E-06		1.06E-04	0.00E+00

18 sources in main construction area
10 sources in laydown area B
5 sources in laydown area 1
5 sources in laydown area 9
8 sources in pipe excavation area

Excavations and Foundations - Fugitive Dust Emissions

Maximum construction activity occurs in month 6.

Bulldozing/Earth clearing

$E = 0.45 * G^{1.5} / H^{1.4} * 2.2046$ PM10 Emissions from bulldozing (lb/hr) from SCAQMD Table A9-9-F

7.5 G = Silt content (%) (from Table A9-9-F-1 for overburden)

15 H = Moisture content of surface material (%) (from Table A9-9-F-2 for moist dirt)

0.46 lb/hr of PM10

Equipment	Quantity	Hours/Day	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)
Wheeled Loader	4	8	85%	0.28	2.21	0.06	0.46
Tracked Dozer	6	6	85%	0.41	2.48	0.09	0.52
Backhoe	3	6	85%	0.21	1.24	0.04	0.26
Excavator	6	8	85%	0.41	3.31	0.09	0.69
			Total	**1.31**	**9.24**	**0.27**	**1.92**

22 construction days per month

7 Total months of soil movement

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

Dirt Piling or Material Handling

$E = 0.00112 * (G/5)^{1.3} / (H/2)^{1.4}$ PM10 Emissions from Dirt Piling or Material Handling (lb/hr) from SCAQMD Table A9-9-G

12 G = Mean Wind speed (mph) default

15 H = Moisture content of surface material (%) (from Table A9-9-G-1 for moist dirt)

0.00021 lb/ton of PM10

Equipment	Quantity	Hours/Day	Material Handled (ton/day)	Material Handled (ton)	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)
Wheeled Loader	4	8	260	39,978	85%	0.0010	0.0081	0.0002	0.0017
Dump Trucks	5	6	260	39,978	85%	0.0014	0.0081	0.0003	0.0017
					Total	**0.0024**	**0.0162**	**0.0005**	**0.0034**

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants

220 yd3/day 260 ton/day
33,880 yd3 39,978 tons 2360 density of soil (lb/yd3)
(USDA NRCS Physical Soil Properties from San Bernardino County
Western Part for Tujunga Sandy Loam soil)
14 acres = 33,880 cubic yds, assume depth of 0.5 yd (1.5 ft) of soils moved

Cover Storage Pile
SCAQMD Table A9-9-E
E = 1.7 * G/1.5 * (365-H)/235 * I/15 * J
PM10 Emission factor from wind erosion of storage piles per day per acre
7.5 G = Silt content (%) (from Table A9-9-E-1 for overburden)
34 H = Mean number of days per year with at least 0.01 inches of precipitation (from Western Regional Climate Center for Riverside Fire Station)
1.7 I = Percentage of time that the unobstructed wind speed exceeds 12 mph at mean pile height
0.5 J = Fraction of TSP that is PM10 = 0.5
0.678 lb/acre/day

wind speed percentage based on 1994-99 (5 yrs) of wind speed data (actual hours > 10 knots) as recorded at Ontario station

Source	Quantity	Size of Pile (acre)	Hours/Day	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)
Cover Storage Pile	3	1.5	24	85%	0.02	0.46	0.004	0.095

Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants
pile size assumed

Travel on unpaved road
F = 2.1 * G/12 * H/30 * $(J/3)^{0.7}$ * $(I/4)^{0.5}$ * (365-K)/365 SCAQMD Table A9-9-D
Emission factor for vehicle travel on unpaved roads (lb/VMT)
12.5 G = Surface silt loading (%) (average value for Tujunga Loamy sand at site)
5 H = Mean vehicle speed (mph)
value listed in table I = Mean number of wheels on vehicle
value listed in table J = Mean vehicle weight (ton)
34 K = Mean number of days per year with at least 0.01 inches of precipitation (from Western Regional Climate Center for Riverside Fire Station)

Vehicle Type	No. Of Unit	Round Trips /Day/ Unit	Round Trip Distance (mile)	Daily VMT (all units)	Mean Vehicle Weight (tons)	Number of Wheels on Vehicle	PM10 EF (lbs/VMT)	Watering Control Efficiency	PM10 Emissions (lb/hr)	PM10 Emissions (lb/day)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (lb/day)
Roller Compactor	6	4	0.25	6	11	4	0.82	85%	0.07	0.74	0.01	0.16
Bobcat	3	4	0.25	3	3	4	0.33	85%	0.01	0.15	0.00	0.03
Rough Terrain Forkli	3	4	0.25	3	7	4	0.60	85%	0.02	0.27	0.01	0.06
Air Compressor	2	1	0	0	0.5	2	0.07	85%	0.00	0.00	0.00	0.00
Welder	4	1	0	0	0.5	2	0.07	85%	0.00	0.00	0.00	0.00
Crane	1	1	0	0	40	12	3.51	85%	0.00	0.00	0.00	0.00
Crane	1	1	0.25	0.25	40	12	3.51	85%	0.01	0.13	0.00	0.03
Concrete Pump	1	1	0.25	0.25	0.5	2	0.07	85%	0.00	0.00	0.00	0.00
Aerial Lift	4	1	0.25	1	7	4	0.60	85%	0.01	0.09	0.00	0.02
Grout Mixer	1	1	0	0	0.5	2	0.07	85%	0.00	0.00	0.00	0.00
Dump Truck	5	4	1	20	13	10	1.46	85%	0.40	4.38	0.08	0.93
Trucks - Pickup 3/4 ton	15	1	1	15	1	4	0.15	85%	0.03	0.34	0.01	0.07
Water Truck	1	10	2	20	13	10	1.46	85%	0.40	4.38	0.08	0.93
Worker's Vehicles in Parking lot	178	1	0.75	133	0.5	4	0.09	85%	0.17	1.88	0.04	0.40
								Total	**1.12**	**12.36**	**0.24**	**2.62**

Assumed maximum travel speed is 5 mph
Equipment weight from SCAQMD Table A9-9-D-3
Water efficiency from CEQA Table 11-4 watering 3 times daily or using chemical suppressants
PM2.5 emission factors from updated CEIDARS List with PM2.5 fractions.
PM2.5 numbers obtained by multiplying the PM10 values by fraction in CEIDARS list for appropriate fugitive dust sources.
Round trips/day uses 1 trip per hour for dump trucks. Water trucks operate 2 times per hour. Service trucks use 1 trips per day.
Distances measured from plot plan from highway along access road to center of construction area and parking lot.
11 Maximum number of construction work hours per day

Emission location	Activity
Various	excavation
Roads	truck & worker travel

Total MODEL EMISSION RATE (lb/hr)			
PM10 24hr	PM10 Annual	PM2.5 24hr	PM2.5 Annual
0.883		0.1837	
1.124		0.2383	

18 sources in main construction area B
10 sources in laydown area B
5 sources in laydown area 1
5 sources in laydown area 9
8 sources in pipe excavation area

Location	X (m)	Y (m)	AREA (m2)	percent of total area
MAINDUST	325	174	56550	0.397
LAYDN1	255	95	24225	0.170
LAYDN9	100	35	3500	0.025
PIPEA	100	10	1000	0.007
PIPEB	100	10	1000	0.007
PIPEC	100	10	1000	0.007
PIPED	30	10	300	0.002
PIPEE	10	100	1000	0.007
PIPEF	10	30	300	0.002
PIPEG	100	10	1000	0.007
PIPEH	42	10	420	0.003
ALTB			52050	0.366

MODEL EMISSION RATE per Source (g/s-m2)			
PM10 24hr	PM10 Annual	PM2.5 24hr	PM2.5 Annual
7.83E-07		1.63E-07	
7.83E-07		1.63E-07	
7.83E-07		1.63E-07	
7.83E-07		1.63E-07	
7.83E-07		1.63E-07	
7.83E-07		1.63E-07	
7.83E-07		1.63E-07	
7.83E-07		1.63E-07	
7.83E-07		1.63E-07	
7.83E-07		1.63E-07	
7.83E-07		1.63E-07	
7.83E-07		1.63E-07	
7.83E-07		1.63E-07	

Total Construction Area			142345			
Note 3 smaller areas make up AltB						
ALTB1	290	115	33350			
ALTB2	95	125	11875			
ALTB3	195	35	6825			
ROAD1	12	120	1440	0.118	9.10E-06	1.89E-06
ROAD2	12	120	1440	0.118	9.10E-06	1.89E-06
ROAD3	12	120	1440	0.118	9.10E-06	1.89E-06
ROAD4	12	120	1440	0.118	9.10E-06	1.89E-06
ROAD5	12	120	1440	0.118	9.10E-06	1.89E-06
ROAD6	12	60	720	0.059	9.10E-06	1.89E-06
ROAD7	120	12	1440	0.118	9.10E-06	1.89E-06
ROAD8	120	12	1440	0.118	9.10E-06	1.89E-06
ROAD9	120	12	1440	0.118	9.10E-06	1.89E-06
Total Road Area			12240			

Appendix K-3
Operating Emissions

Quarterly and Annual Operating Conditions

Operating Conditions	**Annual**
Number of Starts	234
Hot Starts	164
Warm Starts	50
Cold Starts	20
Startup/Shutdown Time (hours)	337
Turbine Operation no duct burners (hours)	3,446
Duct Burner Operation (hours)	4,000
Total CTG Normal Operating Hours	7,446

Criteria Pollutant Emission Rates for the San Gabriel Generating Station Turbines and SCR with Ammonia Injection During Normal Operation (pounds per hour for both turbines)

		Ambient Temperature			
Load	Pollutant	25 ^{o}F	63 ^{o}F	105 ^{o}F	ISO
100% Unfired	VOC	2.2	2.0	1.9	2.1
	Ammonia Slip	27.4	25.7	24.5	26.9
	CO	7.2	6.8	6.4	7.1
	NO_X	29.6	27.8	26.4	29.1
	SO_2	2.3	2.2	2.1	2.3
	PM_{10}	11.5	11.5	11.5	11.5
80% Unfired	VOC	3.5	3.2	2.8	3.4
	Ammonia Slip	23.0	21.3	18.6	22.2
	CO	6.0	5.6	4.9	5.9
	NO_X	24.8	23.0	21.0	25.1
	SO_2	2.0	1.8	1.6	1.9
	PM_{10}	11.5	11.5	11.5	11.5
60% Unfired	VOC	6.1	5.6	5.0	6.0
	Ammonia Slip	18.4	17.1	15.3	18.1
	CO	12.1	11.2	10.1	4.8
	NO_X	18.4	17.1	15.3	18.1
	SO_2	1.6	1.5	1.3	1.6
	PM_{10}	11.5	11.5	11.5	11.5
100% With Duct Burners	VOC	2.8	2.6	2.6	2.7
	Ammonia Slip	35.7	34.1	33.0	35.0
	CO	20.2	19.9	19.9	19.6
	NO_X	36.6	35.0	33.8	35.9
	SO_2	3.0	2.9	2.8	3.0
	PM_{10}	12.0	12.0	12.0	12.0

Criteria Pollutant Emission Rates During Startup and Shutdown (for both turbines)

	Cold Startup 150 minutes		Warm Startup 120 minutes		Hot Startup 40 minutes		Shutdown 20 minutes	
Pollutant	Max	Total	Max	Total	Max	Total	Max	Total
	lb/hr	lb/ event	lb/hr	lb/ event	lb/hr	lb/ event	lb/hr	lb/ event
NO_X	134	243	134	192	79	68	65	46
CO	1,740	2,806	1,846	2,261	738	735	866	862
VOC	99	163	97	131	52	51	30	28
SO_2	2.1	2	2.1	2	2.1	0.39	2.1	0.24
PM_{10}	12	19	12	15	12	5	12	3

Note: Startup/shutdown duration defined as operation of CTG below 60% load when gaseous emission rates (lb/hr basis) exceed those defined as normal operation.

Criteria Pollutant Annual Emissions for the Turbines

Pollutant	Annual Emissions	Emission rate per turbine
	Tons	(g/s)
NO_X	136	1.958
CO	297	4.279
VOC	21	0.305
SO_2	10	0.138
PM_{10}	45	0.649

Notes:

1) Includes emissions from two combustion turbine/duct burners

2) Emissions include 20 cold starts, 50 warm starts, 164 hot starts, and 234 shutdowns and 4,000 hours at 100% duct burner capacity and 3,446 hours operating at 100% CT load at 63 ^{o}F.

Worst-Case Short-Term Emission Estimates (both turbines)

1-Hr Emissions (lb/hr)		Emission rate (lb/period	Emission rate per turbine (g/s)
NO_X	134	134.2	8.46
CO	1,846	1846	116.38
VOC	99	99	6.24
SO_2	3.0	3.0	0.19
PM_{10}	12	11.5	0.73

3-Hr Emissions (lb/hr)		Emission rate (lb/period	Emission rate per turbine (g/s)
SO_2	3.0	9.0	0.19

8-Hr Emissions (lb/hr)		Emission rate (lb/period	Emission rate per turbine (g/s)
CO	562	4494	35.42

24-Hr Emissions (lb/day)		Emission rate (lb/period	Emission rate per turbine (g/s)
NO_X	1,107	1107	2.91
CO	4,817	4817	12.66
VOC	300	300	0.79
SO_2	72	72	0.19
PM_{10}	288	288	0.76

Notes:

1) The 1-hr NO_X, CO, VOC, and PM10 are based on the worst case start-up/shutdown condition

2) The 1-hr, 3-hr and 24-hr SO_2 emission rate is based on maximum fuel consumption, 25°F ambient will full duct firing

3) The 8-hr CO emission rate is based on 1 cold-start, **1 hot-start**, 1 shutdown and balance of time operating at 25°Fambient w

4) The 24-hr NO_X, CO, and VOC emission rates are based on 1 cold-start, **1-hot-start,** 1 shutdown and balance of time operating at 25°F ambient with full duct firing.

5) The 24-hr PM_{10} emission rate is based on an ambient temperature of 25°F with full duct firing

Estimated Criteria Pollutant Emissions from Gas Turbine Commissioning

Pollutant	Worst-Case Normal Hourly Emissions	Total Commissioning Period Emissions
	lb/hr/ct	tons
NO_X	137	18
CO	3,455	597
VOC	87	10
SO_2	1.4	0.4
PM_{10}	6	3

Notes

1. Emissions during individual Unit 1 and Unit 2 operation are uncontrolled.
2. Emissions during combined Unit 1 and Unit 2 steam blows are uncontrolled.
3. Oxidation catalyst and SCR catalyst are installed after combined steam blows.

Auxiliary Boiler Emissions

Pollutant	Emission Factor (lb/MMBtu LHV)	Emissions		Short-term Emissions (g/s)	Annual Emissions (g/s)
		lb/hr	ton/yr		
NO_X	0.0137	0.69	1.39	0.087	0.040
CO	0.0471	2.38	4.75	0.300	0.137
VOC	0.0051	0.26	0.51	0.032	0.015
SO_2	0.0008	0.04	0.08	0.005	0.002
PM_{10}	0.0064	0.32	0.64	0.040	0.018

Notes:
1) NO_X emissions based on 9 ppm @ 3% O2 dry.
2) Annual emissions based on 4,000 hours of operation
3) Auxiliary Boiler Heat Input 56 mmBTU/Hr (HHV)

Fire Pump Engine Emissions

Not Applicable - Fire Water Supplied from Existing Plant Fire Pumps

Annual Emissions

Both Turbines with Auxiliary Boiler

Pollutant	Annual Emissions ton/yr
NO_X	137.4
CO	302.0
VOC	21.7
SO_2	9.7
PM_{10}	45.7

Notes:
1) Includes emissions from two turbines, duct burners & auxiliary boiler
2) Emissions include 20 cold starts, 50 warm starts, 164 hot starts, and 234 shutdowns and 4,000 hours at 100% duct burner capacity and 3,446 hours operating at 100% CT load at 63 ^{o}F.

	NO_X	CO	VOC	SO_2	PM_{10}
lb total	36,808	1,194,928	19,236	827	5,664
ton total	18.4	597.5	9.6	0.4	2.8
ton/CTG	9.2	298.7	4.8	0.2	1.4

UNIT 1

Activity	Emissions	Duration (hours)	CT Load (%)	Fuel Consumption mmBtu (LHV)	Fuel Consumption lbm	O_2 vol %, wet	NO_X lb/hr	CO lb/hr	VOC lb/hr	SO_2 lb/hr	PM_{10} lb/hr	NO_X lb	CO lb	VOC lb	SO_2 lb	PM_{10} lb
First fire to FSNL	Uncontrolled	12	0%	4,332	211,296	18.11	41	3,307	41	0.2	5	489	39,680	497	3	60
Green rotor run-in	Uncontrolled	12	0%	4,332	211,296	18.11	41	3,307	41	0.2	5	489	39,680	497	3	60
Manual Trips/Mechanical Overspeed trip test	Uncontrolled	8	0%	2,888	140,864	18.11	41	3,307	41	0.2	5	326	26,453	331	2	40
GT FSNL Lean-Lean Mode	Uncontrolled	8	0%	2,888	140,864	18.11	41	3,307	41	0.2	5	326	26,453	331	2	40
Electronic Overspeed Tests	Uncontrolled	8	0%	2,888	140,864	18.11	41	3,307	41	0.2	5	326	26,453	331	2	40
Unanticipated problems	Uncontrolled	8	0%	2,888	140,864	18.11	41	3,307	41	0.2	5	326	26,453	331	2	40
Initial Synchronization	Uncontrolled	4	4%	1,675	80,520	17.92	63	3,455	51	0.3	5	252	13,822	203	1	20
On-line excitation checks	Uncontrolled	16	4%	6,700	322,080	17.92	63	3,455	51	0.3	5	1,009	55,287	814	4	80
DLN Tuning/Load Testing - 0%	Uncontrolled	12	0%	4,332	211,296	18.11	41	3,307	41	0.2	5	489	39,680	497	3	60
DLN Tuning/Load Testing - 25%	Uncontrolled	12	25%	8,460	412,710	15.57	125	3,033	87	0.4	5	1,494	36,390	1,050	5	60
DLN Tuning/Load Testing - 50%	Uncontrolled	12	50%	12,432	606,408	13.40	62	379	25	0.7	5	748	4,553	304	8	60
DLN Tuning/Load Testing - 75%	Uncontrolled	12	75%	16,488	804,552	12.84	49	13	3	0.9	6	591	160	41	10	69
DLN Tuning/Load Testing - 100%	Uncontrolled	12	100%	20,299	990,360	12.60	61	17	1	1.1	6	734	199	17	13	69
Loss of CT Processor Testing	Uncontrolled	8	100%	13,533	660,240	12.60	61	17	1	1.1	6	489	132	11	9	46
CTG 1 steam blow 1	Uncontrolled	12	4%	5,025	241,560	17.92	63	3,455	51	0.3	5	757	41,466	610	3	60
CTG 1 steam blow 2	Uncontrolled	12	4%	5,025	241,560	17.92	63	3,455	51	0.3	5	757	41,466	610	3	60
CTG 1 steam blow 3	Uncontrolled	12	4%	5,025	241,560	17.92	63	3,455	51	0.3	5	757	41,466	610	3	60
CTG 1 steam blow 4	Uncontrolled	12	4%	5,025	241,560	17.92	63	3,455	51	0.3	5	757	41,466	610	3	60

UNIT 2

Activity	Emissions	Duration (hours)	CT Load (%)	Fuel Consumption mmBtu (LHV)	Fuel Consumption lbm	O_2 vol %, wet	NO_X lb/hr	CO lb/hr	VOC lb/hr	SO_2 lb/hr	PM_{10} lb/hr	NO_X lb	CO lb	VOC lb	SO_2 lb	PM_{10} lb
First fire to FSNL	Uncontrolled	12	0%	4,332	211,296	18.11	41	3,307	41	0.2	5	489	39,680	497	3	60
Green rotor run-in	Uncontrolled	12	0%	4,332	211,296	18.11	41	3,307	41	0.2	5	489	39,680	497	3	60
Manual Trips/Mechanical Overspeed trip test	Uncontrolled	8	0%	2,888	140,864	18.11	41	3,307	41	0.2	5	326	26,453	331	2	40
GT FSNL Lean-Lean Mode	Uncontrolled	8	0%	2,888	140,864	18.11	41	3,307	41	0.2	5	326	26,453	331	2	40
Electronic Overspeed Tests	Uncontrolled	8	0%	2,888	140,864	18.11	41	3,307	41	0.2	5	326	26,453	331	2	40
Unanticipated problems	Uncontrolled	8	0%	2,888	140,864	18.11	41	3,307	41	0.2	5	326	26,453	331	2	40
Initial Synchronization	Uncontrolled	4	4%	1,675	80,520	17.92	63	3,455	51	0.3	5	252	13,822	203	1	20
On-line excitation checks	Uncontrolled	16	4%	6,700	322,080	17.92	63	3,455	51	0.3	5	1,009	55,287	814	4	80
DLN Tuning/Load Testing - 0%	Uncontrolled	12	0%	4,332	211,296	18.11	41	3,307	41	0.2	5	489	39,680	497	3	60
DLN Tuning/Load Testing - 25%	Uncontrolled	12	25%	8,460	412,710	15.57	125	3,033	87	0.4	5	1,494	36,390	1,050	5	60
DLN Tuning/Load Testing - 50%	Uncontrolled	12	50%	12,432	606,408	13.40	62	379	25	0.7	5	748	4,553	304	8	60
DLN Tuning/Load Testing - 75%	Uncontrolled	12	75%	16,488	804,552	12.84	49	13	3	0.9	6	591	160	41	10	69
DLN Tuning/Load Testing - 100%	Uncontrolled	12	100%	20,299	990,360	12.60	61	17	1	1.1	6	734	199	17	13	69
Loss of CT Processor Testing	Uncontrolled	8	100%	13,533	660,240	12.60	61	17	1	1.1	6	489	132	11	9	46
CTG 2 steam blow 1	Uncontrolled	12	4%	5,025	241,560	17.92	63	3,455	51	0.3	5	757	41,466	610	3	60
CTG 2 steam blow 2	Uncontrolled	12	4%	5,025	241,560	17.92	63	3,455	51	0.3	5	757	41,466	610	3	60
CTG 2 steam blow 3	Uncontrolled	12	4%	5,025	241,560	17.92	63	3,455	51	0.3	5	757	41,466	610	3	60
CTG 2 steam blow 4	Uncontrolled	12	4%	5,025	241,560	17.92	63	3,455	51	0.3	5	757	41,466	610	3	60

UNITS 1 & 2 COMBINED

Activity	Emissions	Duration (hours)	CT Load (%)	Fuel Consumption mmBtu (LHV)	Fuel Consumption lbm	O_2 vol %, wet	NO_X lb/hr	CO lb/hr	VOC lb/hr	SO_2 lb/hr	PM_{10} lb/hr	NO_X lb	CO lb	VOC lb	SO_2 lb	PM_{10} lb
Combined Steam Blow 1	Uncontrolled	12	4%	10,050	483,120	17.92	63	3,455	51	0.3	5	1,513	82,931	1,220	6	120
Combined Steam Blow 1	Uncontrolled	12	4%	10,050	483,120	17.92	63	3,455	51	0.3	5	1,513	82,931	1,220	6	120
Load oxidation & SCR catalyst																
Fire for STG prep	Controlled	12	30%	18,600	906,960	15.08	137	1,000	33	0.5	5	3,285	24,002	796	12	120
Unit base load	Controlled	24	100%	81,198	3,961,440	12.40	14	3	1	1.1	5.8	653	159	48	51	276
Unit base load	Controlled	24	100%	81,198	3,961,440	12.40	14	3	1	1.1	5.8	653	159	48	51	276
Fire for STG testing	Controlled	24	100%	81,198	3,961,440	12.40	14	3	1	1.1	5.8	653	159	48	51	276
Fire for STG testing	Controlled	24	100%	81,198	3,961,440	12.40	14	3	1	1.1	5.8	653	159	48	51	276
Fire for STG testing	Controlled	24	100%	81,198	3,961,440	12.40	14	3	1	1.1	5.8	653	159	48	51	276
Fire for STG base load	Controlled	24	100%	81,198	3,961,440	12.40	14	3	1	1.1	5.8	653	159	48	51	276
Fire for STG base load	Controlled	24	100%	81,198	3,961,440	12.40	14	3	1	1.1	5.8	653	159	48	51	276
Fire for STG base load	Controlled	24	100%	81,198	3,961,440	12.40	14	3	1	1.1	5.8	653	159	48	51	276
Fire for STG base load	Controlled	24	100%	81,198	3,961,440	12.40	14	3	1	1.1	5.8	653	159	48	51	276
Duct Burner Testing	Controlled	24	110%	108,318	5,283,978	9.75	18	10	1	1.4	6.0	871	478	62	68	288
Duct Burner Testing	Controlled	24	110%	108,318	5,283,978	9.75	18	10	1	1.4	6.0	871	478	62	68	288
SCR Testing	Controlled	12	100%	40,599	1,980,720	12.40	14	3	1	1.1	5.8	326	79	24	26	138
Stack Testing (RATA)	Controlled	12	100%	40,599	1,980,720	12.40	14	3	1	1.1	5.8	326	79	24	26	138
TOTAL				**1,315,780**	**64,136,465**											

Notes 1. Emissions during individual Unit 1 and Unit 2 operation is uncontrolled, i.e., oxidation catalyst and SCR catalyst have not been installed.
2. Emissions during combined Unit 1 and Unit 2 steam Blows are uncontrolled.
3. Oxidation catalyst and SCR catalyst are installed after combined steam blows.

R1 Changed steam blow from 24 to 12 hrs
Reduced steam blows from 15 to 10 total
Assumed catalyst loaded after combined steam blows

R2 Changed initial sync, online excitation checks, and steam blows from 20% load to 4% load

R3 Changed combined for STG prep from 24 to 12 hrs, VOC emissions divide by 2

R4 Added fuel consumption 5/10/2007

R5 Added actual O_2 values 6/7/2007

ATOMIC WEIGHTS

Hydrogen	H	lb/lbatom	1.008
Carbon	C	lb/lbatom	12.011
Nitrogen	N	lb/lbatom	14.007
Oxygen	O	lb/lbatom	15.999
Argon	Ar	lb/lbatom	39.948
Sulfur	S	lb/lbatom	32.066

NATURAL GAS ANALYSIS

Pressure = 14.696 lb_f/in^2

Temperature = 60 ^oF

Component		MW [lb/lbmol]	Reported mole %	Normalized mole %	Normalized weight %	Specific Volume [ft^3/lb]	Higher Heating Value (1) Btu/lbm	Higher Heating Value (1) Btu/ft^3	Lower Heating Value (1) Btu/lbm	Lower Heating Value (1) Btu/ft^3
Nitrogen	N_2	28.01	0.320	0.320	0.533	13.55	0	0	0	0
Carbon Dioxide	CO_2	44.01	1.500	1.500	3.924	8.63	0	0	0	0
Carbon Monoxide	CO	28.01	0.000	0.000	0.000	13.55	4,342.0	320.5	4,342.0	320.5
Hydrogen	H_2	2.02	0.000	0.000	0.000	188.32	61,022.0	324.2	51,566.0	273.9
Methane	CH_4	16.04	96.350	96.350	91.873	23.66	23,891.0	1,010.0	21,511.0	909.4
Ethane	C_2H_6	30.07	1.450	1.450	2.592	12.63	22,333.0	1,769.7	20,429.0	1,618.7
Propane	C_3H_8	44.10	0.280	0.280	0.734	8.61	21,653.0	2,516.1	19,922.0	2,314.9
Iso-Butane	C_4H_{10}	58.12	0.100	0.100	0.345	6.53	21,232.0	3,251.9	19,590.0	3,000.4
n-Butane	C_4H_{10}	58.12	0.000	0.000	0.000	6.53	21,300.0	3,262.3	19,658.0	3,010.8
Iso-Pentane	C_5H_{12}	72.15	0.000	0.000	0.000	5.26	21,043.0	4,000.9	19,456.0	3,699.0
n-Pentane	C_5H_{12}	72.15	0.000	0.000	0.000	5.26	21,085.0	4,008.9	19,481.0	3,703.9
n-Hexane	C_6H_{14}	86.18	0.000	0.000	0.000	4.41	20,943.0	4,755.9	19,393.0	4,403.9
n-Heptane	C_7H_{16}	100.20	0.000	0.000	0.000	3.79	20,839.0	5,502.5	19,315.0	5,100.3
Ethylene	C_2H_4	28.05	0.000	0.000	0.000	13.53	21,640.0	1,600.0	20,278.0	1,499.0
Propylene	C_3H_6	42.08	0.000	0.000	0.000	9.02	21,039.0	2,333.0	19,678.0	2,182.0
neo-Pentane	C_5H_{12}	72.15	0.000	0.000	0.000	5.26	20,958.0	3,985.0	19,371.0	3,683.0
Oxygen	O_2	32.00	0.000	0.000	0.000	11.86	0	0	0	0
Water	H_2O	18.02	0.000	0.000	0.000	21.07	1,059.8	50.3	0	0
Total			**100.00**	**100.00**	**100.00**		**22,760**	**1,009.1**	**20,506**	**909.2**

Molecular Weight [lb/lbmol] 16.82 16.82

HHV/LHV Ratio 1.110 1.110

Sulfur Content 0.200 grains/ 100 ft^3
0.000645 wt %

grains/ 100 ft^3 Contract Limit

Notes
(1) Ideal Calorific Values from ASTM D3588 - 98

SIEMENS

Reliant Energy - Etiwanda Project

Estimated SGT6-5000F Gas Turbine Performance
Gas Turbine in Combined Cycle / Dry Low NOx Combustor
AeroPac II 2-102x196 / 0.85 Power Factor

Based on CTT-2586 Rev.3
June 27, 2007

SITE CONDITIONS:	**CASE 1**	**CASE 2**	**CASE 3**	**CASE 4**	**CASE 5**	**CASE 6**	**CASE 7**	**CASE 8**	**CASE 9**	**CASE 10**	**CASE 11**	**CASE 12**
FUEL TYPE	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
LOAD LEVEL	BASE	90%	80%	70%	60%	50%	40%	30%	20%	10%	4%	FSNL
NET FUEL HEATING VALUE, Btu/lbm (LHV)	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,797	20,497
GROSS FUEL HEATING VALUE, Btu/lbm (HHV)		22,752		22,752		22,752	22,752	22,752	22,752	22,752	23,073	22,752
EVAPORATIVE COOLER STATUS/EFFECTIVENESS	off	OFF	off	OFF	off	OFF	OFF	OFF	OFF	OFF	OFF	OFF
AMBIENT DRY BULB TEMPERATURE, °F	63	63	63	63	63	63	63	63	63	63	63.0	63
AMBIENT WET BULB TEMPERATURE, °F		55.9		55.9		55.9	55.9	55.9	55.9	55.9	55.9	55.9
AMBIENT RELATIVE HUMIDITY, %	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%
BAROMETRIC PRESSURE, psia	14.11	14.111	14.11	14.111	14.11	14.111	14.111	14.111	14.111	14.111	14.117	14.111
COMPRESSOR INLET TEMPERATURE, °F		63		63		63	63	63	63	63	63.0	63
INLET PRESSURE LOSS, inches of water (Total)	4.1	3.5	4.1	2.6	4.1	1.9	1.7	1.7	1.7	1.7	2.1	1.7
EXHAUST PRESSURE LOSS, inches of water (Total)	22	21.5	22	16.2	22	11.7	10.4	9.6	8.8	8	8.7	7.1
EXHAUST PRESSURE LOSS, inches of water (Static)		18.7		14.1		10.2	9.1	8.3	7.6	6.9	7.6	6.2
GAS TURBINE PERFORMANCE:												
GROSS POWER OUTPUT, kW	184,700	166,349	149,000	129,381	111,700	92,415	73,930	55,446	36,962	18,478	4,610	0
GROSS HEAT RATE, Btu/kWh (LHV)	9,159	9,319	9,785	9,974	10,724	11,208	12,254	13,970	17,188	27,336	90,655	*****
GROSS HEAT RATE, Btu/kWh (HHV)		10,344		11,071		12,441	13,602	15,507	19,079	30,343	100,575	*****
FUEL FLOW, lbm/hr	82,530	75,627	71,133	62,959	58,470	50,534	44,198	37,790	30,995	24,644	20,130	17,608
HEAT INPUT, mmBtu/hr (LHV)	1,692	1,550	1,458	1,290	1,198	1,036	906	775	635	505	419	361
HEAT INPUT, mmBtu/hr (HHV)		1,721		1,432		1,150	1,006	860	705	561	465	401
EXHAUST TEMPERATURE, °F	1,094	1,098	1,094	1,098	1,094	1,098	1,040	934	830	726	608	607
EXHAUST FLOW, lbm/hr	3,792,499	3,523,196	3,247,993	3,043,745	2,753,000	2,580,430	2,477,317	2,470,600	2,464,036	2,457,567	2,647,468	2,450,609
EXHAUST GAS COMPOSITION (BY % VOL):												
OXYGEN	12.6	12.69	12.7	12.98	13.1	13.4	14.08	15.08	16.06	17.04	17.92	18.11
CARBON DIOXIDE	3.8	3.72	3.7	3.59	3.5	3.39	3.08	2.62	2.16	1.71	1.30	1.22
WATER	8.5	8.44	8.4	8.19	8.1	7.81	7.2	6.31	5.43	4.55	3.77	3.6
NITROGEN	74.2	74.27	74.3	74.37	74.4	74.52	74.76	75.11	75.46	75.8	76.10	76.18
ARGON	0.9	0.87	0.9	0.87	0.9	0.87	0.88	0.88	0.89	0.89	0.91	0.89
MOLECULAR WEIGHT	28.38	28.37	28.38	28.39	28.39	28.41	28.45	28.51	28.56	28.62	28.67	28.68
NET EMISSIONS: Based on USEPA test methods												
NOx, ppmvd @ 15% O2	9	9	9	9	9	15	45	45	45	50	40	30
NOx, lbm/hr as NO2	61	58	52	48	42	64	168	141	116	100	65	42
CO, ppmvd @ 15% O2	4	4	4	4	10	150	700	1,800	1,800	3,000	3,600	4,000
CO, lbm/hr	17	16	14	13	29	391	1,586	3,441	2,816	3,666	3,558	3,413
VOC, ppmvd @ 15% O2 as CH4	1	1	1	1	5	30	50	75	60	120	300	300
VOC, lbm/hr as CH4	2	2.2	2	1.9	8	45	65	82	54	84	146	146
PARTICULATES, lbm/hr	8	8	8	8	8	8	10.5	10.5	10.6	10.6	10.6	8

NOTES:
- All data is estimated and not guaranteed.
- Performance is based on new and clean condition.
- Gross power output is at the generator terminals. It does not include econopac auxiliary load losses.
- Estimated GT Performance values are dependent upon receiving test tolerances equal to measurement uncertainty calculated in accordance with ASME PTC 19.1-1998.
- Emission flowrates are calculated based on the maximum achievable exhaust flow. For further details on flowrate calculation contact Siemens.
- VOC consist of total hydrocarbons excluding methane and ethane and are expressed in terms of methane (CH_4).
- Particulates are per US EPA Method 5/202 (front and back half).
- Gas Fuel composition Mol %: 96.35% CH_4, 1.45% C_2H_6, 0.28% C_3H_8, 0.10% C_4H_{10}, 1.50% CO_2 and 0.32% N_2.
- Average temperature of the gas fuel is 410°F. Sensible heat of the fuel is not included in the fuel heating values.
- Emissions exclude ambient air contributions.
- Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant design and/or performance relative to contractual commitments. Data included in any permit application or Environmental Impact Statement are strictly the customer's responsibility. Siemens is available to review permit application data upon request.

SIEMENS

Reliant Energy - Etiwanda Project

Estimated SGT6-5000F Gas Turbine Performance

6/13/2007

SITE CONDITIONS:	**CASE 1**	**CASE 2**	**CASE 3**	**CASE 4**	**CASE 5**	**CASE 6**	**CASE 7**	**CASE 8**	**CASE 9**	**CASE 10**	**CASE 11**	**CASE 12**	**CASE 13**	**CASE 14**	**CASE 15**	**CASE 16**	**CASE 17**	**CASE 18**	**CASE 19**	**CASE 20**	**CASE 21**	**CASE 22**
FUEL TYPE	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
LOAD LEVEL	BASE	BASE	80%	60%	BASE	BASE	80%	60%	BASE	BASE	80%	60%	BASE	80%	60%	BASE	80%	60%	BASE	BASE	80%	60%
NET FUEL HEATING VALUE, Btu/lbm (LHV)	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497	20,497
GROSS FUEL HEATING VALUE, Btu/lbm (HHV)																						
EVAPORATIVE COOLER STATUS/EFFECTIVENESS	on	off	off	off	on	off	off	off	on	off	off	off	off	off	off	off	off	off	on	off	off	off
AMBIENT DRY BULB TEMPERATURE, °F	105	105	105	105	95	95	95	95	63	63	63	63	40	40	40	25	25	25	59	59	59	59
AMBIENT WET BULB TEMPERATURE, °F																						
AMBIENT RELATIVE HUMIDITY, %	15%	15%	15%	15%	30%	30%	30%	30%	65%	65%	65%	65%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
BAROMETRIC PRESSURE, psia	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.7	14.69	14.69	14.69
COMPRESSOR INLET TEMPERATURE, °F																						
INLET PRESSURE LOSS, inches of water (Total)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
EXHAUST PRESSURE LOSS, inches of water (Total)	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
EXHAUST PRESSURE LOSS, inches of water (Static)																						
GAS TURBINE PERFORMANCE:																						
GROSS POWER OUTPUT, kW	176,400	153,300	123,700	92,800	176,500	160,500	129,500	97,100	189,200	184,700	149,000	111,700	198,900	160,400	120,300	206,400	166,500	124,900	200,200	195,500	157,700	118,300
GROSS HEAT RATE, Btu/kWh (LHV)	9,289	9,648	10,382	11,488	9,292	9,530	10,234	11,297	9,109	9,159	9,785	10,724	8,992	9,575	10,468	8,929	9,492	10,370	9,066	9,113	9,728	10,653
GROSS HEAT RATE, Btu/kWh (HHV)																						
FUEL FLOW, lbm/hr	79,942	72,175	62,669	52,009	80,009	74,634	64,666	53,536	84,071	82,530	71,133	58,470	87,270	74,959	61,460	89,947	77,121	63,190	88,535	86,913	74,854	61,480
HEAT INPUT, mmBtu/hr (LHV)	1,639	1,479	1,285	1,066	1,640	1,530	1,325	1,097	1,723	1,692	1,458	1,198	1,789	1,536	1,260	1,844	1,581	1,295	1,815	1,781	1,534	1,260
HEAT INPUT, mmBtu/hr (HHV)																						
EXHAUST TEMPERATURE, °F	1,107	1,130	1,131	1,131	1,107	1,123	1,124	1,124	1,090	1,094	1,094	1,094	1,076	1,076	1,076	1,067	1,068	1,068	1,086	1,090	1,090	1,090
EXHAUST FLOW, lbm/hr	3,669,555	3,405,808	2,943,210	2,520,552	3,666,314	3,484,839	3,003,550	2,565,554	3,842,850	3,792,499	3,247,993	2,753,000	3,983,177	3,396,057	2,871,221	4,081,620	3,471,378	2,933,152	4,044,598	3,993,142	3,416,749	2,893,904
EXHAUST GAS COMPOSITION (BY % VOL):																						
OXYGEN	12.4	12.8	13	13.3	12.4	12.7	12.8	13.1	12.5	12.6	12.7	13.1	12.7	12.8	13.2	12.7	12.8	13.2	12.6	12.6	12.8	13.1
CARBON DIOXIDE	3.8	3.7	3.6	3.4	3.8	3.7	3.6	3.5	3.8	3.8	3.7	3.5	3.8	3.7	3.6	3.8	3.8	3.6	3.8	3.8	3.7	3.5
WATER	9.4	8.2	8.1	7.8	9.6	8.8	8.7	8.4	8.8	8.5	8.4	8.1	7.8	7.7	7.4	7.6	7.5	7.2	8.5	8.2	8.1	7.8
NITROGEN	73.5	74.4	74.5	74.6	73.4	74	74	74.1	74.1	74.2	74.3	74.4	74.8	74.9	75	75	75	75.1	74.3	74.5	74.5	74.6
ARGON	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
MOLECULAR WEIGHT	28.28	28.40	28.43	28.42	28.29	28.37	28.34	28.36	28.38	28.38	28.38	28.39	28.46	28.45	28.51	28.48	28.49	28.50	28.41	28.41	28.41	28.40
NET EMISSIONS: Based on USEPA test methods																						
NOx, ppmvd @ 15% O2	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
NOx, lbm/hr as NO2	59	54	46	38	59	56	47	39	63	61	52	42	65	55	45	67	56	46	66	65	55	45
CO, ppmvd @ 15% O2	4	4	4	10	4	4	4	10	4	4	4	10	4	4	10	4	4	10	4	4	4	10
CO, lbm/hr	16	15	12	10	16	15	13	11	17	17	14	11	18	15	12	18	15	12	18	17	15	12
VOC, ppmvd @ 15% O2 as CH4	1	1	1	5	1	1	1	5	1	1	1	5	1	1	5	1	1	5	1	1	1	5
VOC, lbm/hr as CH4	2	2	2	7	2	2	2	7	2	2	2	8	2	2	9	3	2	9	3	2	2	9
PARTICULATES, lbm/hr	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8

NOTES:

- All performance data refer to LHV. The data are for information purposes only and any warranty and/or liability is excluded. Data to be guaranteed must be submitted in a formal proposal.
- It is assumed that all components of the specified scope of supply are designed to handle the specified part load/off design conditions without any additional technical measures. GT part load operation may be limited due to emission regulations.
- This sheet contains information proprietary to Siemens. It is submitted in confidence and is to be used solely for the purpose for which it is furnished i.e. evaluation of Siemens products within recipients conduct of business and returned upon request. This information is not to be reproduced, transmitted, disclosed, or used otherwise, in whole or in part, without the written authorizat
- Gas fuel composition is: CH4= 96.35%; C2H6= 1.45%; C3H8= 0.28%; C4H10= 0.10%; CO2= 1.50%; N2= 0.32%

CASE		CASE 1A	CASE 1B	CASE 1C	CASE 1D	CASE 2A	CASE 2B	CASE 2C	CASE 2D	CASE 3A	CASE 3B	CASE 3C	CASE 3D	CASE 4A	CASE 4B	CASE 4C	CASE 4D
SWPC Case		CASE 1	CASE 2	CASE 3	CASE 4	CASE 9	CASE 9	CASE 11	CASE 12	CASE 16	CASE 16	CASE 17	CASE 18	CASE 19	CASE 19	CASE 21	CASE 22
Ambient Conditions		105°F -15% RH	105°F -15% RH	105°F -15% RH	105°F -15% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	25°F -60% RH	25°F -60% RH	25°F -60% RH	25°F -60% RH	59°F -60% RH	59°F -60% RH	59°F -60% RH	59°F -60% RH
CT Load		Base	Base	80%	60%	Base	Base	80%	60%	Base	Base	80%	60%	Base	Base	80%	60%
Duct Burner		Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired
Evap Cooler		ON	ON	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF
SITE CONDITIONS																	
Ambient Temperature	°F	105	105	105	105	63	63	63	63	25	25	25	25	59	59	59	59
Relative Humidity	%	15%	15%	15%	15%	65%	65%	65%	65%	60%	60%	60%	60%	60%	60%	60%	60%
Site Elevation	feet																
Atmospheric Pressure	psia	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.70	14.70	14.69	14.69
FACILITY CONDITIONS																	
CT Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CT Model		W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F
CT Load	%	BASE	BASE	80%	60%	BASE	BASE	80%	60%	BASE	BASE	80%	60%	BASE	BASE	80%	60%
CT Evap Coolers	ON/OFF	on	on	off	off	on	on	off	off	off	off	off	off	on	on	off	off
CT Power Output	kW	176,400	176,400	123,700	92,800	189,200	189,200	149,000	111,700	206,400	206,400	166,500	124,900	200,200	200,200	157,700	118,300
CT Heat Consumption (LHV)	MBtu/hr	1,638.6	1,638.6	1,284.5	1,066.0	1,723.2	1,723.2	1,458.0	1,198.5	1,843.6	1,843.6	1,580.7	1,295.2	1,814.7	1,814.7	1,534.3	1,260.2
CT Heat Consumption (HHV)	MBtu/hr	1,818.7	1,818.7	1,425.7	1,183.2	1,912.6	1,912.6	1,618.3	1,330.2	2,046.3	2,046.3	1,754.5	1,437.6	2,014.2	2,014.2	1,703.0	1,398.7
CT Fuel Flow Rate	lb/hr	79,907	79,907	62,641	51,986	84,034	84,034	71,102	58,444	89,907	89,907	77,087	63,162	88,496	88,496	74,821	61,453
CT Fuel Flow Rate	MSCF/hr	1.80	1.80	1.41	1.17	1.90	1.90	1.60	1.32	2.03	2.03	1.74	1.42	2.00	2.00	1.69	1.39
CT Exhaust Gas Flow Rate	lb/hr	3,669,555	3,669,555	2,943,210	2,520,552	3,842,850	3,842,850	3,247,993	2,753,000	4,081,620	4,081,620	3,471,378	2,933,152	4,044,598	4,044,598	3,416,749	2,893,904
CT Exhaust Gas Temperature	°F	1,107	1,107	1,131	1,131	1,090	1,090	1,094	1,094	1,067	1,067	1,068	1,068	1,086	1,086	1,090	1,090
DB Heat Consumption (LHV)	MBtu/hr	565.0	0.0	0.0	0.0	557.0	0.0	0.0	0.0	555.0	0.0	0.0	0.0	537.0	0.0	0.0	0.0
DB Heat Consumption (HHV)	MBtu/hr	627.1	0.0	0.0	0.0	618.2	0.0	0.0	0.0	616.0	0.0	0.0	0.0	596.0	0.0	0.0	0.0
DB Fuel Flow Rate	lb/hr	27,553	0	0	0	27,163	0	0	0	27,065	0	0	0	26,187	0	0	0
DB Fuel Flow Rate	MSCF/hr	0.62	0.00	0.00	0.00	0.61	0.00	0.00	0.00	0.61	0.00	0.00	0.00	0.59	0.00	0.00	0.00
Atomic Weights	lb/lbatom																
Hydrogen	1.008																
Carbon	12.011																
Nitrogen	14.007																
Oxygen	15.999																
Argon	39.948																
Sulfur	32.066																
NATURAL GAS ANALYSIS																	
Name		SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas
	MW	mol %	mol %	mol %	mol %	mol %	mol %	mol %	mol %	mol %	mol %	mol %	mol %	mol %	mol %	mol %	mol %
Nitrogen, N_2	28.01	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320	0.320
Carbon Dioxide, CO_2	44.01	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500
Carbon Monoxide, CO	28.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen, H_2	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Methane, CH_4	16.04	96.350	96.350	96.350	96.350	96.350	96.350	96.350	96.350	96.350	96.350	96.350	96.350	96.350	96.350	96.350	96.350
Ethane, C_2H_6	30.07	1.450	1.450	1.450	1.450	1.450	1.450	1.450	1.450	1.450	1.450	1.450	1.450	1.450	1.450	1.450	1.450
Propane, C_3H_8	44.10	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280	0.280
Iso-Butane, C_4H_{10}	58.12	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
n-Butane, C_4H_{10}	58.12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Iso-Pentane, C_5H_{12}	72.15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
n-Pentane, C_5H_{12}	72.15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane, C_6H_{14}	86.18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
n-Heptane, C_7H_{16}	100.20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethylene, C_2H_4	28.05	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Propylene, C_3H_6	42.08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
neo-Pentane, C_5H_{12}	72.15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Oxygen, O_2	32.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Water, H_2O	18.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total		*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*
	MW	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %
Nitrogen, N_2	28.01	0.533	0.533	0.533	0.533	0.533	0.533	0.533	0.533	0.533	0.533	0.533	0.533	0.533	0.533	0.533	0.533
Carbon Dioxide, CO_2	44.01	3.924	3.924	3.924	3.924	3.924	3.924	3.924	3.924	3.924	3.924	3.924	3.924	3.924	3.924	3.924	3.924
Carbon Monoxide, CO	28.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen, H_2	2.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Methane, CH_4	16.04	91.873	91.873	91.873	91.873	91.873	91.873	91.873	91.873	91.873	91.873	91.873	91.873	91.873	91.873	91.873	91.873
Ethane, C_2H_6	30.07	2.592	2.592	2.592	2.592	2.592	2.592	2.592	2.592	2.592	2.592	2.592	2.592	2.592	2.592	2.592	2.592
Propane, C_3H_8	44.10	0.734	0.734	0.734	0.734	0.734	0.734	0.734	0.734	0.734	0.734	0.734	0.734	0.734	0.734	0.734	0.734
Iso-Butane, C_4H_{10}	58.12	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345
n-Butane, C_4H_{10}	58.12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Iso-Pentane, C_5H_{12}	72.15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
n-Pentane, C_5H_{12}	72.15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane, C_6H_{14}	86.18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
n-Heptane, C_7H_{16}	100.20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethylene, C_2H_4	28.05	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Propylene, C_3H_6	42.08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
neo-Pentane, C_5H_{12}	72.15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Oxygen, O_2	32.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Water, H_2O	18.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total		*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*
Fuel LHV	Btu/lb	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506
Fuel HHV	Btu/lb	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760
Fuel LHV	Btu/ft^3	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2
Fuel HHV	Btu/ft^3	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1
HHV/LHV Ratio		1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110
Total Sulfur, S	grains/100 ft^3	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
COMBUSTION TURBINE EXHAUST ANALYSIS																	
Argon, Ar	% vol	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Nitrogen, N_2	% vol	73.50	73.50	74.50	74.60	74.10	74.10	74.30	74.40	75.00	75.00	75.00	75.10	74.30	74.30	74.50	74.60
Oxygen, O_2	% vol	12.40	12.40	13.00	13.30	12.50	12.50	12.70	13.10	12.70	12.70	12.80	13.20	12.60	12.60	12.80	13.10
Carbon Dioxide, CO_2	% vol	3.80	3.80	3.60	3.40	3.80	3.80	3.70	3.50	3.80	3.80	3.80	3.60	3.80	3.80	3.70	3.50
Water, H_2O	% vol	9.40	9.40	8.10	7.80	8.80	8.80	8.40	8.10	7.60	7.60	7.50	7.20	8.50	8.50	8.10	7.80
Total		*100.0*	*100.0*	*100.1*	*100.0*	*100.1*	*100.1*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.1*	*100.1*	*100.0*	*99.9*
Molecular weight	lb/lbmol	28.28	28.28	28.40	28.41	28.35	28.35	28.38	28.39	28.48	28.48	28.49	28.50	28.38	28.38	28.41	28.42
Argon, Ar	% vol, dry	0.99	0.99	0.98	0.98	0.99	0.99	0.98	0.98	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.98
Nitrogen, N_2	% vol, dry	81.13	81.13	80.98	80.91	81.16	81.16	81.11	80.96	81.17	81.17	81.08	80.93	81.11	81.11	81.07	81.00
Oxygen, O_2	% vol, dry	13.69	13.69	14.13	14.43	13.69	13.69	13.86	14.25	13.74	13.74	13.84	14.22	13.76	13.76	13.93	14.22

CASE		CASE 1A	CASE 1B	CASE 1C	CASE 1D	CASE 2A	CASE 2B	CASE 2C	CASE 2D	CASE 3A	CASE 3B	CASE 3C	CASE 3D	CASE 4A	CASE 4B	CASE 4C	CASE 4D
SWPC Case		CASE 1	CASE 2	CASE 3	CASE 4	CASE 9	CASE 9	CASE 11	CASE 12	CASE 16	CASE 16	CASE 17	CASE 18	CASE 19	CASE 19	CASE 21	CASE 22
Ambient Conditions		105°F -15% RH	105°F -15% RH	105°F -15% RH	105°F -15% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	25°F -60% RH	25°F -60% RH	25°F -60% RH	25°F -60% RH	59°F -60% RH	59°F -60% RH	59°F -60% RH	59°F -60% RH
CT Load		Base	Base	80%	60%	Base	Base	80%	60%	Base	Base	80%	60%	Base	Base	80%	60%
Duct Burner		Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired
Evap Cooler		ON	ON	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF
Carbon Dioxide, CO_2	% vol, dry	4.19	4.19	3.91	3.69	4.16	4.16	4.04	3.81	4.11	4.11	4.11	3.88	4.15	4.15	4.03	3.80
Water, H_2O	% vol, dry	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*
Molecular weight (dry)	lb/lbmol	29.35	29.35	29.32	29.29	29.34	29.34	29.33	29.31	29.34	29.34	29.34	29.32	29.34	29.34	29.33	29.30
	lb/lbmol	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %
Argon, Ar	39.95	1.27	1.27	1.26	1.27	1.27	1.27	1.27	1.27	1.26	1.26	1.26	1.26	1.27	1.27	1.27	1.27
Nitrogen, N_2	28.01	72.80	72.80	73.40	73.55	73.16	73.16	73.34	73.41	73.78	73.78	73.75	73.81	73.27	73.27	73.45	73.60
Oxygen, O_2	32.00	14.03	14.03	14.63	14.98	14.10	14.10	14.32	14.76	14.27	14.27	14.38	14.82	14.19	14.19	14.42	14.76
Carbon Dioxide, CO_2	44.01	5.91	5.91	5.57	5.27	5.89	5.89	5.74	5.43	5.87	5.87	5.87	5.56	5.89	5.89	5.73	5.42
Water, H_2O	18.02	5.99	5.99	5.13	4.95	5.59	5.59	5.33	5.14	4.81	4.81	4.74	4.55	5.39	5.39	5.14	4.95
Total		*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*
Argon, Ar	wt %, dry	1.35	1.35	1.33	1.33	1.34	1.34	1.34	1.33	1.33	1.33	1.32	1.32	1.34	1.34	1.33	1.33
Nitrogen, N_2	wt %, dry	77.44	77.44	77.37	77.37	77.48	77.48	77.47	77.38	77.51	77.51	77.42	77.33	77.44	77.44	77.43	77.43
Oxygen, O_2	wt %, dry	14.92	14.92	15.42	15.76	14.93	14.93	15.13	15.56	14.99	14.99	15.09	15.53	15.00	15.00	15.20	15.53
Carbon Dioxide, CO_2	wt %, dry	6.29	6.29	5.87	5.54	6.24	6.24	6.06	5.72	6.17	6.17	6.16	5.82	6.22	6.22	6.04	5.71
Water, H_2O	wt %, dry	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*
Argon, Ar	lb/hr	46,647	46,647	37,217	31,892	48,692	48,692	41,149	34,860	51,535	51,535	43,809	36,998	51,187	51,187	43,235	36,642
Nitrogen, N_2	lb/hr	2,671,412	2,671,412	2,160,338	1,853,765	2,811,263	2,811,263	2,382,173	2,020,855	3,011,597	3,011,597	2,560,076	2,164,969	2,963,291	2,963,291	2,509,684	2,129,848
Oxygen, O_2	lb/hr	514,804	514,804	430,601	377,515	541,701	541,701	465,109	406,443	582,513	582,513	499,078	434,663	574,014	574,014	492,538	427,216
Carbon Dioxide, CO_2	lb/hr	216,980	216,980	164,002	132,732	226,490	226,490	186,367	149,353	239,718	239,718	203,778	163,041	238,096	238,096	195,815	156,986
Water, H_2O	lb/hr	219,713	219,713	151,051	124,648	214,704	214,704	173,196	141,489	196,256	196,256	164,637	133,481	218,011	218,011	175,478	143,212
Total		*3,669,555*	*3,669,555*	*2,943,210*	*2,520,552*	*3,842,850*	*3,842,850*	*3,247,993*	*2,753,000*	*4,081,620*	*4,081,620*	*3,471,378*	*2,933,152*	*4,044,598*	*4,044,598*	*3,416,749*	*2,893,904*
Argon, Ar	moles/hr	1,168	1,168	932	798	1,219	1,219	1,030	873	1,290	1,290	1,097	926	1,281	1,281	1,082	917
Nitrogen, N_2	moles/hr	95,362	95,362	77,118	66,174	100,354	100,354	85,037	72,139	107,505	107,505	91,387	77,283	105,781	105,781	89,588	76,029
Oxygen, O_2	moles/hr	16,088	16,088	13,457	11,798	16,929	16,929	14,535	12,702	18,204	18,204	15,597	13,584	17,939	17,939	15,392	13,351
Carbon Dioxide, CO_2	mr/es/hr	4,930	4,930	3,726	3,016	5,146	5,146	4,235	3,394	5,447	5,447	4,630	3,705	5,410	5,410	4,449	3,567
Water, H_2O	moles/hr	12,196	12,196	8,385	6,919	11,918	11,918	9,614	7,854	10,894	10,894	9,139	7,409	12,101	12,101	9,740	7,949
Total		*129,744*	*129,744*	*103,617*	*88,705*	*135,566*	*135,566*	*114,450*	*96,961*	*143,340*	*143,340*	*121,850*	*102,907*	*142,512*	*142,512*	*120,253*	*101,814*
Argon, Ar	moles/hr, dry	1,168	1,168	932	798	1,219	1,219	1,030	873	1,290	1,290	1,097	926	1,281	1,281	1,082	917
Nitrogen, N_2	moles/hr, dry	95,362	95,362	77,118	66,174	100,354	100,354	85,037	72,139	107,505	107,505	91,387	77,283	105,781	105,781	89,588	76,029
Oxygen, O_2	moles/hr, dry	16,088	16,088	13,457	11,798	16,929	16,929	14,535	12,702	18,204	18,204	15,597	13,584	17,939	17,939	15,392	13,351
Carbon Dioxide, CO_2	moles/hr, dry	4,930	4,930	3,726	3,016	5,146	5,146	4,235	3,394	5,447	5,447	4,630	3,705	5,410	5,410	4,449	3,567
Water, H_2O	moles/hr, dry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		*117,548*	*117,548*	*95,233*	*81,786*	*123,648*	*123,648*	*104,837*	*89,107*	*132,446*	*132,446*	*112,711*	*95,498*	*130,411*	*130,411*	*110,512*	*93,865*
COMBUSTION TURBINE EMISSIONS (per CT)																	
NO_x	ppmvd @ 15% O_2	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
NO_x	ppmvd	11.0	11.0	10.3	9.9	11.0	11.0	10.7	10.1	10.9	10.9	10.8	10.2	10.9	10.9	10.6	10.2
NO_x as NO_2 S&L Calculated	lb/hr	59.5	59.5	45.2	37.2	62.6	62.6	51.8	41.6	66.5	66.5	55.9	44.7	65.4	65.4	54.1	44.0
NO_x as NO_2 METHOD 19 F Factor	lb/hr	60.3	60.3	47.3	39.2	63.4	63.4	53.7	44.1	67.8	67.8	58.2	47.7	66.8	66.8	56.5	46.4
NO_x as NO_2 SWPC Perfomance Runs	lb/hr	59.0	59.0	46.0	38.0	63.0	63.0	52.0	42.0	67.0	67.0	56.0	46.0	66.0	66.0	55.0	45.0
CO	ppmvd @ 15% O_2	4.0	4.0	4.0	10.0	4.0	4.0	4.0	10.0	4.0	4.0	4.0	10.0	4.0	4.0	4.0	4.0
CO	ppmvd	4.9	4.9	4.6	11.0	4.9	4.9	4.8	11.3	4.9	4.9	4.8	11.3	4.8	4.8	4.7	4.5
CO	lb/hr	16.1	16.1	12.2	25.1	16.9	16.9	14.0	28.1	18.0	18.0	15.1	30.3	17.7	17.7	14.6	11.9
CO SWPC Perfomance Runs	lb/hr	16.0	16.0	12.0	10.0	17.0	17.0	14.0	11.0	18.0	18.0	15.0	12.0	18.0	18.0	15.0	12.0
VOC	ppmvd @ 15% O_2	0.6	0.6	1.2	2.5	0.6	0.6	1.2	2.5	0.6	0.6	1.2	2.5	0.6	0.6	1.2	2.5
VOC	ppmvd	0.7	0.7	1.3	2.7	0.7	0.7	1.4	2.8	0.7	0.7	1.4	2.8	0.7	0.7	1.4	2.8
VOC	lb/hr	1.4	1.4	2.0	3.6	1.5	1.5	2.3	4.0	1.5	1.5	2.5	4.3	1.5	1.5	2.4	4.3
VOC SWPC Perfomance Runs	lb/hr	1.0	1.0	1.0	3.5	1.0	1.0	1.0	4.0	1.5	1.5	1.0	4.5	1.5	1.5	1.0	4.5
SO_2	ppmvd @ 15% O_2	0.11	0.11	0.12	0.12	0.11	0.11	0.11	0.12	0.11	0.11	0.11	0.12	0.11	0.11	0.12	0.12
SO_2	ppmvd	0.14	0.14	0.13	0.13	0.14	0.14	0.14	0.13	0.14	0.14	0.14	0.13	0.14	0.14	0.14	0.13
SO_2	lb/hr	1.03	1.03	0.81	0.67	1.08	1.08	0.92	0.75	1.16	1.16	0.99	0.81	1.14	1.14	0.96	0.79
SO_3 Oxidation	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SO_3	ppmvd @ 15% O_2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SO_3	ppmvd	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SO_3	lb/hr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PM10																	
Front Half	lb/hr																
Back Half	lb/hr																
Total	lb/hr	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75
DUCT BURNER EMISSIONS (per CT/HRSG)																	
Argon, Ar	lb/hr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen, N_2	lb/hr	147	0	0	0	145	0	0	0	144	0	0	0	140	0	0	0
Oxygen, O_2	lb/hr	-104,714	0	0	0	-103,232	0	0	0	-102,861	0	0	0	-99,525	0	0	0
Carbon Dioxide, CO_2	lb/hr	73,507	0	0	0	72,466	0	0	0	72,206	0	0	0	69,864	0	0	0
Water, H_2O	lb/hr	58,613	0	0	0	57,783	0	0	0	57,576	0	0	0	55,709	0	0	0
Total		*27,553*	*0*	*0*	*0*	*27,163*	*0*	*0*	*0*	*27,065*	*0*	*0*	*0*	*26,187*	*0*	*0*	*0*
DB Heat Consumption (HHV)	MBtu/hr	627.1	0.0	0.0	0.0	618.2	0.0	0.0	0.0	616.0	0.0	0.0	0.0	596.0	0.0	0.0	0.0
NO_x	lb/MBtu, HHV	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
NO_x	lb/hr	50.2	0.0	0.0	0.0	49.5	0.0	0.0	0.0	49.3	0.0	0.0	0.0	47.7	0.0	0.0	0.0
CO	lb/MBtu, HHV	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
CO	lb/hr	50.2	0.0	0.0	0.0	49.5	0.0	0.0	0.0	49.3	0.0	0.0	0.0	47.7	0.0	0.0	0.0
VOC	lb/MBtu, HHV	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
VOC	lb/hr	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.0
SO_2	lb/hr	0.36	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.34	0.00	0.00	0.00
SO_3 Oxidation	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SO_3	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM10																	
Front Half	lb/MBtu, HHV																
Front Half	lb/hr																
Back Half	lb/hr																
Total	lb/hr	0.25	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.25	0.00	0.00	0.00

CASE		CASE 1A	CASE 1B	CASE 1C	CASE 1D	CASE 2A	CASE 2B	CASE 2C	CASE 2D	CASE 3A	CASE 3B	CASE 3C	CASE 3D	CASE 4A	CASE 4B	CASE 4C	CASE 4D
SWPC Case		CASE 1	CASE 2	CASE 3	CASE 4	CASE 9	CASE 9	CASE 11	CASE 12	CASE 16	CASE 16	CASE 17	CASE 18	CASE 19	CASE 19	CASE 21	CASE 22
Ambient Conditions		105°F -15% RH	105°F -15% RH	105°F -15% RH	105°F -15% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	25°F -60% RH	25°F -60% RH	25°F -60% RH	25°F -60% RH	59°F -60% RH	59°F -60% RH	59°F -60% RH	59°F -60% RH
CT Load		Base	Base	80%	60%	Base	Base	80%	60%	Base	Base	80%	60%	Base	Base	80%	60%
Duct Burner		Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired
Evap Cooler		ON	ON	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF
POST DUCT BURNER EXHAUST COMPOSTION (per CT/HRSG)																	
Argon, Ar	lb/hr	46,647	46,647	37,217	31,892	48,692	48,692	41,149	34,860	51,535	51,535	43,809	36,998	51,187	51,187	43,235	36,642
Nitrogen, N_2	lb/hr	2,671,558	2,671,412	2,160,338	1,853,765	2,811,408	2,811,263	2,382,173	2,020,855	3,011,741	3,011,597	2,560,076	2,164,969	2,963,430	2,963,291	2,509,684	2,129,848
Oxygen, O_2	lb/hr	410,090	514,804	430,601	377,515	438,470	541,701	465,109	406,443	479,652	582,513	499,078	434,663	474,489	574,014	492,538	427,216
Carbon Dioxide, CO_2	lb/hr	290,487	216,980	164,002	132,732	298,956	226,490	186,367	149,353	311,925	239,718	203,778	163,041	307,960	238,096	195,815	156,986
Water, H_2O	lb/hr	278,326	219,713	151,051	124,648	272,487	214,704	173,196	141,489	253,832	196,256	164,637	133,481	273,719	218,011	175,478	143,212
Total		*3,697,108*	*3,669,555*	*2,943,210*	*2,520,552*	*3,870,013*	*3,842,850*	*3,247,993*	*2,753,000*	*4,108,685*	*4,081,620*	*3,471,378*	*2,933,152*	*4,070,785*	*4,044,598*	*3,416,749*	*2,893,904*
Argon, Ar	wt %	1.26	1.27	1.26	1.27	1.26	1.27	1.27	1.27	1.25	1.26	1.26	1.26	1.26	1.27	1.27	1.27
Nitrogen, N_2	wt %	72.26	72.80	73.40	73.55	72.65	73.16	73.34	73.41	73.30	73.78	73.75	73.81	72.80	73.27	73.45	73.60
Oxygen, O_2	wt %	11.09	14.03	14.63	14.98	11.33	14.10	14.32	14.76	11.67	14.27	14.38	14.82	11.66	14.19	14.42	14.76
Carbon Dioxide, CO_2	wt %	7.86	5.91	5.57	5.27	7.72	5.89	5.74	5.43	7.59	5.87	5.87	5.56	7.57	5.89	5.73	5.42
Water, H_2O	wt %	7.53	5.99	5.13	4.95	7.04	5.59	5.33	5.14	6.18	4.81	4.74	4.55	6.72	5.39	5.14	4.95
Total		*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Argon, Ar	moles/hr	1,168	1,168	932	798	1,219	1,219	1,030	873	1,290	1,290	1,097	926	1,281	1,281	1,082	917
Nitrogen, N_2	moles/hr	95,367	95,362	77,118	66,174	100,359	100,354	85,037	72,139	107,510	107,505	91,387	77,283	105,786	105,781	89,588	76,029
Oxygen, O_2	moles/hr	12,816	16,088	13,457	11,798	13,703	16,929	14,535	12,702	14,990	18,204	15,597	13,584	14,828	17,939	15,392	13,351
Carbon Dioxide, CO_2	moles/hr	6,601	4,930	3,726	3,016	6,793	5,146	4,235	3,394	7,088	5,447	4,630	3,705	6,998	5,410	4,449	3,567
Water, H_2O	moles/hr	15,449	12,196	8,385	6,919	15,125	11,918	9,614	7,854	14,090	10,894	9,139	7,409	15,194	12,101	9,740	7,949
Total		*131,400*	*129,744*	*103,617*	*88,705*	*137,199*	*135,566*	*114,450*	*96,961*	*144,968*	*143,340*	*121,850*	*102,907*	*144,087*	*142,512*	*120,253*	*101,814*
Argon, Ar	moles/hr, dry	1,168	1,168	932	798	1,219	1,219	1,030	873	1,290	1,290	1,097	926	1,281	1,281	1,082	917
Nitrogen, N_2	moles/hr, dry	95,367	95,362	77,118	66,174	100,359	100,354	85,037	72,139	107,510	107,505	91,387	77,283	105,786	105,781	89,588	76,029
Oxygen, O_2	moles/hr, dry	12,816	16,088	13,457	11,798	13,703	16,929	14,535	12,702	14,990	18,204	15,597	13,584	14,828	17,939	15,392	13,351
Carbon Dioxide, CO_2	moles/hr, dry	6,601	4,930	3,726	3,016	6,793	5,146	4,235	3,394	7,088	5,447	4,630	3,705	6,998	5,410	4,449	3,567
Water, H_2O	moles/hr, dry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		*115,951*	*117,548*	*95,233*	*81,786*	*122,074*	*123,648*	*104,837*	*89,107*	*130,878*	*132,446*	*112,711*	*95,498*	*128,893*	*130,411*	*110,512*	*93,865*
Argon, Ar	vol %	0.89	0.90	0.90	0.90	0.89	0.90	0.90	0.90	0.89	0.90	0.90	0.90	0.89	0.90	0.90	0.90
Nitrogen, N_2	vol %	72.58	73.50	74.43	74.60	73.15	74.03	74.30	74.40	74.16	75.00	75.00	75.10	73.42	74.23	74.50	74.67
Oxygen, O_2	vol %	9.75	12.40	12.99	13.30	9.99	12.49	12.70	13.10	10.34	12.70	12.80	13.20	10.29	12.59	12.80	13.11
Carbon Dioxide, CO_2	vol %	5.02	3.80	3.60	3.40	4.95	3.80	3.70	3.50	4.89	3.80	3.80	3.60	4.86	3.80	3.70	3.50
Water, H_2O	vol %	11.76	9.40	8.09	7.80	11.02	8.79	8.40	8.10	9.72	7.60	7.50	7.20	10.54	8.49	8.10	7.81
Total		*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Molecular weight	lb/lbmol	28.14	28.28	28.40	28.41	28.21	28.35	28.38	28.39	28.34	28.48	28.49	28.50	28.25	28.38	28.41	28.42
Argon, Ar	vol %, dry	1.01	0.99	0.98	0.98	1.00	0.99	0.98	0.98	0.99	0.97	0.97	0.97	0.99	0.98	0.98	0.98
Nitrogen, N_2	vol %, dry	82.25	81.13	80.98	80.91	82.21	81.16	81.11	80.96	82.15	81.17	81.08	80.93	82.07	81.11	81.07	81.00
Oxygen, O_2	vol %, dry	11.05	13.69	14.13	14.43	11.22	13.69	13.86	14.25	11.45	13.74	13.84	14.22	11.50	13.76	13.93	14.22
Carbon Dioxide, CO_2	vol %, dry	5.69	4.19	3.91	3.69	5.56	4.16	4.04	3.81	5.42	4.11	4.11	3.88	5.43	4.15	4.03	3.80
Water, H_2O	vol %, dry	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Molecular weight (dry)	lb/lbmol	29.48	29.35	29.32	29.29	29.47	29.34	29.33	29.31	29.45	29.34	29.34	29.32	29.46	29.34	29.33	29.30
POST DUCT BURNER EMISSIONS (per CT/HRSG)																	
NO_X	ppmvd @ 15% O_2	12.3	9.0	9.0	9.0	12.2	9.0	9.0	9.0	12.0	9.0	9.0	9.0	12.0	9.0	9.0	9.0
NO_X	ppmvd	20.6	11.0	10.3	9.9	19.9	11.0	10.7	10.1	19.2	10.9	10.8	10.2	19.1	10.9	10.6	10.2
NO_X as NO_2 S&L Calculated	lb/hr	109.7	59.5	45.2	37.2	112.0	62.6	51.8	41.6	115.8	66.5	55.9	44.7	113.1	65.4	54.1	44.0
NO_X as NO_2 METHOD 19 F Factor	lb/hr	111.0	60.3	47.3	39.2	113.4	63.4	53.7	44.1	117.8	67.8	58.2	47.7	115.1	66.8	56.5	46.4
CO	ppmvd @ 15% O_2	12.2	4.0	4.0	10.0	11.8	4.0	4.0	10.0	11.5	4.0	4.0	10.0	11.4	4.0	4.0	4.0
CO	ppmvd	20.4	4.9	4.6	11.0	19.4	4.9	4.8	11.3	18.4	4.9	4.8	11.3	18.1	4.8	4.7	4.5
CO	lb/hr	66.3	16.1	12.2	25.1	66.4	16.9	14.0	28.1	67.3	18.0	15.1	30.3	65.4	17.7	14.6	11.9
VOC	ppmvd @ 15% O_2	0.6	0.6	1.2	2.5	0.6	0.6	1.2	2.5	0.6	0.6	1.2	2.5	0.6	0.6	1.2	2.5
VOC	ppmvd	1.0	0.7	1.3	2.7	1.0	0.7	1.4	2.8	0.9	0.7	1.4	2.8	0.9	0.7	1.4	2.8
VOC	ppmvw	0.9	0.7	1.2	2.5	0.9	0.7	1.3	2.6	0.9	0.7	1.3	2.6	0.8	0.7	1.2	2.6
VOC	lb/hr	1.8	1.4	2.0	3.6	1.9	1.5	2.3	4.0	2.0	1.5	2.5	4.3	1.9	1.5	2.4	4.3
SO_2	ppmvd @ 15% O_2	0.11	0.11	0.12	0.12	0.11	0.11	0.11	0.12	0.11	0.11	0.11	0.12	0.11	0.11	0.12	0.12
SO_2	ppmvd	0.19	0.14	0.13	0.13	0.18	0.14	0.14	0.13	0.18	0.14	0.14	0.13	0.18	0.14	0.14	0.13
SO_2	lb/hr	1.38	1.03	0.81	0.67	1.43	1.08	0.92	0.75	1.51	1.16	0.99	0.81	1.48	1.14	0.96	0.79
SO_3	ppmvd @ 15% O_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO_3	ppmvd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO_3	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM10																	
Front Half	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Back Half	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXIDATION CATALYST (per CT/HRSG)																	
CO Reduction	% decrease	85	80	80	80	85	80	80	80	85	80	80	80	85	80	80	80
CO	ppmvd @ 15% O_2	1.8	0.8	0.8	2.0	1.8	0.8	0.8	2.0	1.7	0.8	0.8	2.0	1.7	0.8	0.8	0.8
CO	ppmvd	3.1	1.0	0.9	2.2	2.9	1.0	1.0	2.3	2.8	1.0	1.0	2.3	2.7	1.0	0.9	0.9
CO	lb/hr	9.9	3.2	2.4	5.0	10.0	3.4	2.8	5.6	10.1	3.6	3.0	6.1	9.8	3.5	2.9	2.4
VOC Reduction	% decrease	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
VOC (non-methane, non-ethane)	ppmvd @ 15% O_2	0.4	0.4	0.8	1.8	0.4	0.4	0.8	1.8	0.4	0.4	0.8	1.8	0.4	0.4	0.8	1.8
VOC (non-methane, non-ethane)	ppmvd	0.7	0.5	0.9	1.9	0.7	0.5	1.0	2.0	0.7	0.5	1.0	2.0	0.7	0.5	1.0	2.0
VOC as CH_4	lb/hr	1.3	1.0	1.4	2.5	1.3	1.0	1.6	2.8	1.4	1.1	1.7	3.0	1.4	1.1	1.7	3.0
SO_3 Oxidation	% increase	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Δ SO_3	ppmvd @ 15% O_2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Δ SO_3	ppmvd	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Δ SO_3	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POST SCR EMISSIONS (per CT/HRSG)																	
NO_X	ppmvd @ 15% O_2	1.9	2.0	2.0	2.0	1.9	2.0	2.0	2.0	1.9	2.0	2.0	2.0	1.9	2.0	2.0	2.0
NO_X Removal Efficiency	% decrease	84.6	77.8	77.8	77.8	84.4	77.8	77.8	77.8	84.2	77.8	77.8	77.8	84.1	77.8	77.8	77.8
NO_X	ppmvd	3.2	2.4	2.3	2.2	3.1	2.4	2.4	2.3	3.0	2.4	2.4	2.3	3.0	2.4	2.4	2.3
NO_X S&L Calculated	lb/hr	16.9	13.2	10.1	8.3	17.5	13.9	11.5	9.2	18.3	14.8	12.4	9.9	17.9	14.5	12.0	9.8
NO_X as NO_2 METHOD 19 F Factor	lb/hr	17.1	13.4	10.5	8.7	17.7	14.1	11.9	9.8	18.6	15.1	12.9	10.6	18.3	14.8	12.5	10.3
NH_3	ppmvd @ 15% O_2	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
NH_3	ppmvd	8.35	6.11	5.74	5.49	8.20	6.11	5.96	5.63	8.01	6.06	5.98	5.66	7.96	6.05	5.91	5.66
NH_3	lb/hr	16.5	12.2	9.3	7.6	17.0	12.9	10.6	8.5	17.8	13.7	11.5	9.2	17.5	13.4	11.1	9.0
NH_3	lbmol/hr	1.0	0.7	0.5	0.4	1.0	0.8	0.6	0.5	1.0	0.8	0.7	0.5	1.0	0.8	0.7	0.5

CASE		CASE 1A	CASE 1B	CASE 1C	CASE 1D	CASE 2A	CASE 2B	CASE 2C	CASE 2D	CASE 3A	CASE 3B	CASE 3C	CASE 3D	CASE 4A	CASE 4B	CASE 4C	CASE 4D
SWPC Case		CASE 1	CASE 2	CASE 3	CASE 4	CASE 9	CASE 9	CASE 11	CASE 12	CASE 16	CASE 16	CASE 17	CASE 18	CASE 19	CASE 19	CASE 21	CASE 22
Ambient Conditions		105°F -15% RH	105°F -15% RH	105°F -15% RH	105°F -15% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	25°F -60% RH	25°F -60% RH	25°F -60% RH	25°F -60% RH	59°F -60% RH	59°F -60% RH	59°F -60% RH	59°F -60% RH
CT Load		Base	Base	80%	60%	Base	Base	80%	60%	Base	Base	80%	60%	Base	Base	80%	60%
Duct Burner		Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired	Fired	Unfired	Unfired	Unfired
Evap Cooler		ON	ON	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF
CO	ppmvd @ 15% O_2	1.8	0.8	0.8	2.0	1.8	0.8	0.8	2.0	1.7	0.8	0.8	2.0	1.7	0.8	0.8	0.8
CO	ppmvd	3.1	1.0	0.9	2.2	2.9	1.0	1.0	2.3	2.8	1.0	1.0	2.3	2.7	1.0	0.9	0.9
CO	lb/hr	9.9	3.2	2.4	5.0	10.0	3.4	2.8	5.6	10.1	3.6	3.0	6.1	9.8	3.5	2.9	2.4
VOC	ppmvd @ 15% O_2	0.4	0.4	0.8	1.8	0.4	0.4	0.8	1.8	0.4	0.4	0.8	1.8	0.4	0.4	0.8	1.8
VOC	ppmvd	0.7	0.5	0.9	1.9	0.7	0.5	1.0	2.0	0.7	0.5	1.0	2.0	0.7	0.5	1.0	2.0
VOC	lb/hr	1.3	1.0	1.4	2.5	1.3	1.0	1.6	2.8	1.4	1.1	1.7	3.0	1.4	1.1	1.7	3.0
SO_2	ppmvd @ 15% O_2	0.11	0.11	0.12	0.12	0.11	0.11	0.11	0.12	0.11	0.11	0.11	0.12	0.11	0.11	0.12	0.12
SO_2	ppmvd	0.19	0.14	0.13	0.13	0.18	0.14	0.14	0.13	0.18	0.14	0.14	0.13	0.18	0.14	0.14	0.13
SO_2	lb/hr	1.38	1.03	0.81	0.67	1.43	1.08	0.92	0.75	1.51	1.16	0.99	0.81	1.48	1.14	0.96	0.79
SO_3 Oxidation across SCR	% increase	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SO_3 Oxidation across SCR	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO_3	ppmvd @ 15% O_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO_3	ppmvd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO_3	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO_3	lbmol/hr	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$(NH_4)_2SO_4$, Ammonium Sulfate	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM10																	
Front Half	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Front Half	lb/MBtu (HHV)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Front Half	grains/scf	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Front Half	grains/dscf	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Back Half	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total PM10	lb/hr	6.00	5.75	5.75	5.75	6.00	5.75	5.75	5.75	6.00	5.75	5.75	5.75	6.00	5.75	5.75	5.75
Total PM10	grains/scf	0.0008	0.0008	0.0010	0.0012	0.0008	0.0008	0.0009	0.0011	0.0008	0.0007	0.0009	0.0010	0.0008	0.0007	0.0009	0.0010
Total PM10	grains/dscf	0.0009	0.0009	0.0011	0.0013	0.0009	0.0008	0.0010	0.0012	0.0008	0.0008	0.0009	0.0011	0.0008	0.0008	0.0009	0.0011
Aqueous Ammonia (per CT/HRSG)																	
Purity	%	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4
Consumption	lb/hr	172.8	99.9	76.0	62.4	177.0	105.0	86.9	69.8	183.4	111.7	93.8	75.1	179.2	109.8	90.8	73.8
Stack Conditions (per CT/HRSG)																	
Internal Diameter	ft	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
Flow	lb/hr	3,697,281	3,669,655	2,943,286	2,520,614	3,870,190	3,842,955	3,248,080	2,753,070	4,108,869	4,081,732	3,471,472	2,933,227	4,070,965	4,044,708	3,416,840	2,893,978
Exit Velocity	ft/s	65.1	65.7	51.4	43.4	66.2	67.5	56.2	47.0	69.5	71.7	60.2	50.1	66.3	68.4	57.0	48.3
Temperature	°F	204.6	220.0	206.5	197.3	188.1	208.6	198.7	190.2	183.9	211.3	202.8	192.9	183.9	211.3	202.8	202.8
Flow	acfm	1,106,789	1,118,137	875,249	738,943	1,126,939	1,148,726	955,442	798,989	1,183,032	1,219,508	1,023,544	851,511	1,128,650	1,163,800	970,248	821,476
Flow	scfm	844,011	833,354	665,541	569,758	881,256	870,750	735,124	622,784	931,154	920,686	782,650	660,978	925,496	915,368	772,393	653,959
Flow	dscfm	744,776	755,019	611,686	525,317	784,103	794,201	673,373	572,339	840,653	850,714	723,951	613,388	827,904	837,639	709,829	602,899

Notes:

MBtu = 10^6 Btu

Emissions Summary
Siemens W501F (2 x 2 x 1) Combined Cycle
Natural Gas Operation

SWPC Case		CASE 1	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	CASE 9	CASE 10	CASE 11	CASE 12
Ambient Conditions		63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH
CT Load		BASE	BASE	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.04	FSNL
Duct Burner		FIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED
Evap Cooler		off	off	OFF	off	OFF	off	OFF	OFF	OFF	OFF	OFF	OFF	OFF
SITE CONDITIONS														
Ambient Temperature	°F	63	63	63	63	63	63	63	63	63	63	63	63	63
Relative Humidity	%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%
Site Elevation	feet													
Atmospheric Pressure	psia	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.11	14.12	14.11
FACILITY CONDITIONS														
CT Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CT Model		W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F	W501F
CT Load	%	BASE	BASE	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.04	FSNL
CT Evap Coolers	ON/OFF	off	off	OFF	off	OFF	off	OFF	OFF	OFF	OFF	OFF	OFF	OFF
CT Power Output	kW	184,700	184,700	166,349	149,000	129,381	111,700	92,415	73,930	55,446	36,962	18,478	4,610	0
CT Heat Consumption (LHV)	MBtu/hr	1,691.6	1,691.6	1,550.0	1,458.0	1,290.0	1,198.5	1,036.0	906.0	775.0	635.0	505.0	418.7	361.0
CT Heat Consumption (HHV)	MBtu/hr	1,877.6	1,877.6	1,720.4	1,618.3	1,431.8	1,330.2	1,149.9	1,005.6	860.2	704.8	560.5	464.8	400.7
CT Fuel Flow Rate	lb/hr	82,494	82,494	75,588	71,102	62,908	58,444	50,522	44,182	37,794	30,967	24,627	20,420	17,605
CT Fuel Flow Rate	MSCF/hr	1.86	1.86	1.70	1.60	1.42	1.32	1.14	1.00	0.85	0.70	0.56	0.46	0.40
CT Exhaust Gas Flow Rate	lb/hr	3,792,499	3,792,499	3,523,196	3,247,993	3,043,745	2,753,000	2,580,430	2,477,317	2,470,600	2,464,036	2,457,567	2,647,468	2,450,609
CT Exhaust Gas Temperature	°F	1,094	1,094	1,098	1,094	1,098	1,094	1,098	1,040	934	830	726	608	607
DB Heat Consumption (LHV)	MBtu/hr	561.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DB Heat Consumption (HHV)	MBtu/hr	622.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DB Fuel Flow Rate	lb/hr	27,358	0	0	0	0	0	0	0	0	0	0	0	0
DB Fuel Flow Rate	MSCF/hr	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NATURAL GAS ANALYSIS														
Name		SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas	SoCalGas
Fuel LHV	Btu/lb	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506	20,506
Fuel HHV	Btu/lb	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760	22,760
Fuel LHV	Btu/ft^3	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2	909.2
Fuel HHV	Btu/ft^3	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1	1,009.1
HHV/LHV Ratio		1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110	1.110
Total Sulfur, S	grains/100 ft^3	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
COMBUSTION TURBINE EXHAUST ANALYSIS (SEE NOTE 3)														
Argon, Ar	% vol	0.90	0.90	0.87	0.90	0.87	0.90	0.87	0.88	0.88	0.89	0.89	0.91	0.89
Nitrogen, N_2	% vol	74.20	74.20	74.27	74.30	74.37	74.40	74.52	74.76	75.11	75.46	75.80	76.10	76.18
Oxygen, O_2	% vol	12.60	12.60	12.69	12.70	12.98	13.10	13.40	14.08	15.08	16.06	17.04	17.92	18.11
Carbon Dioxide, CO_2	% vol	3.80	3.80	3.72	3.70	3.59	3.50	3.39	3.08	2.62	2.16	1.71	1.30	1.22
Water, H_2O	% vol	8.50	8.50	8.44	8.40	8.19	8.10	7.81	7.20	6.31	5.43	4.55	3.77	3.60
Total		*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Molecular weight	lb/lbmol	28.38	28.38	28.37	28.38	28.39	28.39	28.41	28.45	28.51	28.56	28.62	28.67	28.68
Argon, Ar	% vol, dry	0.98	0.98	0.95	0.98	0.95	0.98	0.94	0.95	0.94	0.94	0.93	0.95	0.92
Nitrogen, N_2	% vol, dry	81.09	81.09	81.13	81.11	81.00	80.96	80.84	80.56	80.17	79.79	79.42	79.08	79.02
Oxygen, O_2	% vol, dry	13.77	13.77	13.86	13.86	14.14	14.25	14.54	15.17	16.10	16.98	17.85	18.63	18.79
Carbon Dioxide, CO_2	% vol, dry	4.15	4.15	4.06	4.04	3.91	3.81	3.68	3.32	2.80	2.28	1.79	1.35	1.27
Water, H_2O	% vol, dry	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*
Molecular weight (dry)	lb/lbmol	29.34	29.34	29.33	29.33	29.32	29.31	29.29	29.26	29.21	29.17	29.12	29.08	29.07
	lb/lbmol	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %	wt %
Argon, Ar	39.95	1.27	1.27	1.22	1.27	1.22	1.27	1.22	1.24	1.23	1.24	1.24	1.27	1.24
Nitrogen, N_2	28.01	73.24	73.24	73.33	73.34	73.38	73.41	73.48	73.61	73.81	74.01	74.21	74.37	74.42
Oxygen, O_2	32.00	14.21	14.21	14.31	14.32	14.63	14.76	15.09	15.83	16.93	17.99	19.06	20.01	20.21
Carbon Dioxide, CO_2	44.01	5.89	5.89	5.77	5.74	5.57	5.43	5.25	4.76	4.04	3.33	2.63	1.99	1.87
Water, H_2O	18.02	5.40	5.40	5.36	5.33	5.20	5.14	4.95	4.56	3.99	3.42	2.86	2.37	2.26
Total		*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*
Argon, Ar	wt %, dry	1.34	1.34	1.29	1.34	1.29	1.33	1.29	1.29	1.28	1.29	1.28	1.30	1.27
Nitrogen, N_2	wt %, dry	77.42	77.42	77.49	77.47	77.41	77.38	77.31	77.12	76.87	76.63	76.40	76.17	76.14
Oxygen, O_2	wt %, dry	15.02	15.02	15.12	15.13	15.43	15.56	15.88	16.59	17.63	18.63	19.62	20.49	20.68
Carbon Dioxide, CO_2	wt %, dry	6.23	6.23	6.10	6.06	5.87	5.72	5.53	4.99	4.21	3.45	2.71	2.04	1.92
Water, H_2O	wt %, dry	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*	*100.00*
Argon, Ar	lb/hr	48,043	48,043	43,159	41,149	37,261	34,860	31,567	30,608	30,466	30,672	30,535	33,576	30,383
Nitrogen, N_2	lb/hr	2,777,589	2,777,589	2,583,661	2,382,173	2,233,610	2,020,855	1,896,101	1,823,468	1,823,497	1,823,631	1,823,701	1,968,902	1,823,700
Oxygen, O_2	lb/hr	538,767	538,767	504,255	465,109	445,298	406,443	389,457	392,282	418,191	443,335	468,296	529,673	495,219
Carbon Dioxide, CO_2	lb/hr	223,476	223,476	203,305	186,367	169,389	149,353	135,510	118,022	99,929	82,008	64,634	52,662	45,883
Water, H_2O	lb/hr	204,624	204,624	188,816	173,196	158,186	141,489	127,795	112,937	98,517	84,391	70,400	62,655	55,423
Total		*3,792,499*	*3,792,499*	*3,523,196*	*3,247,993*	*3,043,745*	*2,753,000*	*2,580,430*	*2,477,317*	*2,470,600*	*2,464,036*	*2,457,567*	*2,647,468*	*2,450,609*
Argon, Ar	moles/hr	1,203	1,203	1,080	1,030	933	873	790	766	763	768	764	840	761
Nitrogen, N_2	moles/hr	99,152	99,152	92,229	85,037	79,733	72,139	67,685	65,093	65,094	65,098	65,101	70,284	65,101
Oxygen, O_2	moles/hr	16,837	16,837	15,759	14,535	13,916	12,702	12,171	12,259	13,069	13,855	14,635	16,553	15,476
Carbon Dioxide, CO_2	moles/hr	5,078	5,078	4,620	4,235	3,849	3,394	3,079	2,682	2,271	1,863	1,469	1,197	1,043
Water, H_2O	moles/hr	11,358	11,358	10,481	9,614	8,781	7,854	7,094	6,269	5,469	4,684	3,908	3,478	3,076
Total		*133,628*	*133,628*	*124,169*	*114,450*	*107,212*	*96,961*	*90,819*	*87,069*	*86,664*	*86,269*	*85,876*	*92,352*	*85,457*
Argon, Ar	moles/hr, dry	1,203	1,203	1,080	1,030	933	873	790	766	763	768	764	840	761
Nitrogen, N_2	moles/hr, dry	99,152	99,152	92,229	85,037	79,733	72,139	67,685	65,093	65,094	65,098	65,101	70,284	65,101
Oxygen, O_2	moles/hr, dry	16,837	16,837	15,759	14,535	13,916	12,702	12,171	12,259	13,069	13,855	14,635	16,553	15,476
Carbon Dioxide, CO_2	moles/hr, dry	5,078	5,078	4,620	4,235	3,849	3,394	3,079	2,682	2,271	1,863	1,469	1,197	1,043
Water, H_2O	moles/hr, dry	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		*122,269*	*122,269*	*113,688*	*104,837*	*98,431*	*89,107*	*83,726*	*80,800*	*81,196*	*81,584*	*81,969*	*88,874*	*82,380*
COMBUSTION TURBINE EMISSIONS (per CT)														
NO_X	ppmvd @ 15% O_2	9.0	9.0	9.0	9.0	9.0	9.0	15.0	45.0	45.0	45.0	50.0	40.0	30.0

Emissions Summary
Siemens W501F (2 x 2 x 1) Combined Cycle
Natural Gas Operation

SWPC Case			CASE 1	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	CASE 9	CASE 10	CASE 11	CASE 12
Ambient Conditions			63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH
CT Load			BASE	BASE	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.04	FSNL
Duct Burner			FIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED
Evap Cooler			off	off	OFF	off	OFF	off	OFF	OFF	OFF	OFF	OFF	OFF	OFF
NO_x		ppmvd	10.9	10.9	10.7	10.7	10.3	10.1	16.2	43.7	36.6	29.9	25.8	15.4	10.7
NO_x as NO_2		lb/hr	61.2	61.2	56.2	51.8	46.7	41.6	62.3	162.4	136.9	112.2	97.3	63.1	40.7
NO_x as NO_2	METHOD 19 F Factor	lb/hr	62.3	62.3	57.0	53.7	47.5	44.1	63.5	166.7	142.6	116.8	103.2	68.5	44.3
NO_x as NO_2	SWPC Perfomance Runs	lb/hr	61.0	61.0	58.0	52.0	48.0	42.0	64.0	168.0	141.0	116.0	100.0	64.9	42.0
CO		ppmvd @ 15% O_2	4.0	4.0	4.0	4.0	4.0	10.0	150.0	700.0	1,800.0	1,800.0	3,000.0	3,600.0	4,000.0
CO		ppmvd	4.8	4.8	4.8	4.8	4.6	11.3	161.8	679.5	1,465.7	1,195.3	1,548.7	1,388.1	1,433.0
CO		lb/hr	16.6	16.6	15.2	14.0	12.6	28.1	379.4	1,538.0	3,333.6	2,731.5	3,555.9	3,455.5	3,306.7
CO	SWPC Perfomance Runs	lb/hr	17.0	17.0	16.0	14.0	13.0	29.0	391.0	1,586.0	3,441.0	2,816.0	3,666.0	3,558.0	3,413.0
VOC		ppmvd @ 15% O_2	0.6	0.6	0.6	1.2	2.5	2.5	17.5	30.0	62.5	125.0	100.0	92.5	87.5
VOC		ppmvd	0.7	0.7	0.7	1.4	2.9	2.8	18.9	29.1	50.9	83.0	51.6	35.7	31.3
VOC		lb/hr	1.4	1.4	1.3	2.3	4.5	4.0	25.4	37.8	66.3	108.6	67.9	50.9	41.4
VOC	SWPC Perfomance Runs	lb/hr	1.0	1.0	1.1	1.0	1.0	4.0	22.5	32.5	41.0	27.0	42.0	73.0	73.0
SO_2		ppmvd @ 15% O_2	0.11	0.11	0.11	0.11	0.11	0.12	0.11	0.11	0.11	0.11	0.12	0.12	0.12
SO_2		ppmvd	0.14	0.14	0.13	0.14	0.13	0.13	0.12	0.11	0.09	0.08	0.06	0.05	0.04
SO_2		lb/hr	1.06	1.06	0.97	0.92	0.81	0.75	0.65	0.57	0.49	0.40	0.32	0.26	0.23
SO_3 Oxidation		%	0	0	0	0	0	0	0	0	0	0	0	0	0
SO_3		ppmvd @ 15% O_2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SO_3		ppmvd	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SO_3		lb/hr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PM10															
Front Half		lb/hr													
Back Half		lb/hr													
Total		lb/hr	5.75	5.75	5.75	5.75	5.75	5.75	5.0	5.0	5.0	5.0	5.0	5.0	5.0
DUCT BURNER EMISSIONS (per CT/HRSG)															
Argon, Ar		lb/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitrogen, N_2		lb/hr	146	0	0	0	0	0	0	0	0	0	0	0	0
Oxygen, O_2		lb/hr	-103,973	0	0	0	0	0	0	0	0	0	0	0	0
Carbon Dioxide, CO_2		lb/hr	72,987	0	0	0	0	0	0	0	0	0	0	0	0
Water, H_2O		lb/hr	58,198	0	0	0	0	0	0	0	0	0	0	0	0
Total			*27,358*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
DB Heat Consumption (HHV)		MBtu/hr	622.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NO_x		lb/MBtu, HHV	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
NO_x		lb/hr	49.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CO		lb/MBtu, HHV	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080
CO		lb/hr	49.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VOC		lb/MBtu, HHV	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
VOC		lb/hr	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SO_2		lb/hr	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO_3 Oxidation		%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SO_3		lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM10															
Front Half		lb/MBtu, HHV													
Front Half		lb/hr													
Back Half		lb/hr													
Total		lb/hr	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POST DUCT BURNER EXHAUST COMPOSTION (per CT/HRSG)															
Argon, Ar		lb/hr	48,043	48,043	43,159	41,149	37,261	34,860	31,567	30,608	30,466	30,672	30,535	33,576	30,383
Nitrogen, N_2		lb/hr	2,777,734	2,777,589	2,583,661	2,382,173	2,233,610	2,020,855	1,896,101	1,823,468	1,823,497	1,823,631	1,823,701	1,968,902	1,823,700
Oxygen, O_2		lb/hr	434,794	538,767	504,255	465,109	445,298	406,443	389,457	392,282	418,191	443,335	468,296	529,673	495,219
Carbon Dioxide, CO_2		lb/hr	296,462	223,476	203,305	186,367	169,389	149,353	135,510	118,022	99,929	82,008	64,634	52,662	45,883
Water, H_2O		lb/hr	262,822	204,624	188,816	173,196	158,186	141,489	127,795	112,937	98,517	84,391	70,400	62,655	55,423
Total			*3,819,857*	*3,792,499*	*3,523,196*	*3,247,993*	*3,043,745*	*2,753,000*	*2,580,430*	*2,477,317*	*2,470,600*	*2,464,036*	*2,457,567*	*2,647,468*	*2,450,609*
Argon, Ar		wt %	1.26	1.27	1.22	1.27	1.22	1.27	1.22	1.24	1.23	1.24	1.24	1.27	1.24
Nitrogen, N_2		wt %	72.72	73.24	73.33	73.34	73.38	73.41	73.48	73.61	73.81	74.01	74.21	74.37	74.42
Oxygen, O_2		wt %	11.38	14.21	14.31	14.32	14.63	14.76	15.09	15.83	16.93	17.99	19.06	20.01	20.21
Carbon Dioxide, CO_2		wt %	7.76	5.89	5.77	5.74	5.57	5.43	5.25	4.76	4.04	3.33	2.63	1.99	1.87
Water, H_2O		wt %	6.88	5.40	5.36	5.33	5.20	5.14	4.95	4.56	3.99	3.42	2.86	2.37	2.26
Total			*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Argon, Ar		moles/hr	1,203	1,203	1,080	1,030	933	873	790	766	763	768	764	840	761
Nitrogen, N_2		moles/hr	99,157	99,152	92,229	85,037	79,733	72,139	67,685	65,093	65,094	65,098	65,101	70,284	65,101
Oxygen, O_2		moles/hr	13,588	16,837	15,759	14,535	13,916	12,702	12,171	12,259	13,069	13,855	14,635	16,553	15,476
Carbon Dioxide, CO_2		moles/hr	6,736	5,078	4,620	4,235	3,849	3,394	3,079	2,682	2,271	1,863	1,469	1,197	1,043
Water, H_2O		moles/hr	14,589	11,358	10,481	9,614	8,781	7,854	7,094	6,269	5,469	4,684	3,908	3,478	3,076
Total			*135,273*	*133,628*	*124,169*	*114,450*	*107,212*	*96,961*	*90,819*	*87,069*	*86,664*	*86,269*	*85,876*	*92,352*	*85,457*
Argon, Ar		moles/hr, dry	1,203	1,203	1,080	1,030	933	873	790	766	763	768	764	840	761
Nitrogen, N_2		moles/hr, dry	99,157	99,152	92,229	85,037	79,733	72,139	67,685	65,093	65,094	65,098	65,101	70,284	65,101
Oxygen, O_2		moles/hr, dry	13,588	16,837	15,759	14,535	13,916	12,702	12,171	12,259	13,069	13,855	14,635	16,553	15,476
Carbon Dioxide, CO_2		moles/hr, dry	6,736	5,078	4,620	4,235	3,849	3,394	3,079	2,682	2,271	1,863	1,469	1,197	1,043
Water, H_2O		moles/hr, dry	0	0	0	0	0	0	0	0	0	0	0	0	0
Total			*120,684*	*122,269*	*113,688*	*104,837*	*98,431*	*89,107*	*83,726*	*80,800*	*81,196*	*81,584*	*81,969*	*88,874*	*82,380*
Argon, Ar		vol %	0.89	0.90	0.87	0.90	0.87	0.90	0.87	0.88	0.88	0.89	0.89	0.91	0.89
Nitrogen, N_2		vol %	73.30	74.20	74.28	74.30	74.37	74.40	74.53	74.76	75.11	75.46	75.81	76.10	76.18
Oxygen, O_2		vol %	10.04	12.60	12.69	12.70	12.98	13.10	13.40	14.08	15.08	16.06	17.04	17.92	18.11
Carbon Dioxide, CO_2		vol %	4.98	3.80	3.72	3.70	3.59	3.50	3.39	3.08	2.62	2.16	1.71	1.30	1.22
Water, H_2O		vol %	10.78	8.50	8.44	8.40	8.19	8.10	7.81	7.20	6.31	5.43	4.55	3.77	3.60
Total			*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*

Emissions Summary
Siemens W501F (2 x 2 x 1) Combined Cycle
Natural Gas Operation

SWPC Case		CASE 1	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	CASE 9	CASE 10	CASE 11	CASE 12
Ambient Conditions		63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH
CT Load		BASE	BASE	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.04	FSNL
Duct Burner		FIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED
Evap Cooler		off	off	OFF	off	OFF	off	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Molecular weight	lb/lbmol	28.24	28.38	28.37	28.38	28.39	28.39	28.41	28.45	28.51	28.56	28.62	28.67	28.68
Argon, Ar	vol %, dry	1.00	0.98	0.95	0.98	0.95	0.98	0.94	0.95	0.94	0.94	0.93	0.95	0.92
Nitrogen, N_2	vol %, dry	82.16	81.09	81.13	81.11	81.00	80.96	80.84	80.56	80.17	79.79	79.42	79.08	79.02
Oxygen, O_2	vol %, dry	11.26	13.77	13.86	13.86	14.14	14.25	14.54	15.17	16.10	16.98	17.85	18.63	18.79
Carbon Dioxide, CO_2	vol %, dry	5.58	4.15	4.06	4.04	3.91	3.81	3.68	3.32	2.80	2.28	1.79	1.35	1.27
Water, H_2O	vol %, dry	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total		*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Molecular weight (dry)	lb/lbmol	29.47	29.34	29.33	29.33	29.32	29.31	29.29	29.26	29.21	29.17	29.12	29.08	29.07
POST DUCT BURNER EMISSIONS (per CT/HRSG)														
NO_X	ppmvd @ 15% O_2	12.2	9.0	9.0	9.0	9.0	9.0	15.0	45.0	45.0	45.0	50.0	40.0	30.0
NO_X	ppmvd	20.0	10.9	10.7	10.7	10.3	10.1	16.2	43.7	36.6	29.9	25.8	15.4	10.7
NO_X as NO_2	lb/hr	111.0	61.2	56.2	51.8	46.7	41.6	62.3	162.4	136.9	112.2	97.3	63.1	40.7
NO_X as NO_2 METHOD 19 F Factor	lb/hr	112.7	62.3	57.0	53.7	47.5	44.1	63.5	166.7	142.6	116.8	103.2	68.5	44.3
CO	ppmvd @ 15% O_2	12.0	4.0	4.0	4.0	4.0	10.0	150.0	700.0	1800.0	1800.0	3000.0	3600.0	4000.0
CO	ppmvd	19.6	4.8	4.8	4.8	4.6	11.3	161.8	679.5	1465.7	1195.3	1548.7	1388.1	1433.0
CO	lb/hr	66.4	16.6	15.2	14.0	12.6	28.1	379.4	1,538.0	3,333.6	2,731.5	3,555.9	3,455.5	3,306.7
VOC	ppmvd @ 15% O_2	0.6	0.6	0.6	1.2	2.5	2.5	17.5	30.0	62.5	125.0	100.0	92.5	87.5
VOC	ppmvd	1.0	0.7	0.7	1.4	2.9	2.8	18.9	29.1	50.9	83.0	51.6	35.7	31.3
VOC	ppmvw	0.9	0.7	0.7	1.3	2.6	2.6	17.4	27.0	47.7	78.5	49.3	34.3	30.2
VOC	lb/hr	1.9	1.4	1.3	2.3	4.5	4.0	25.4	37.8	66.3	108.6	67.9	50.9	41.4
SO_2	ppmvd @ 15% O_2	0.11	0.11	0.11	0.11	0.11	0.12	0.11	0.11	0.11	0.11	0.12	0.12	0.12
SO_2	ppmvd	0.18	0.14	0.13	0.14	0.13	0.13	0.12	0.11	0.09	0.08	0.06	0.05	0.04
SO_2	lb/hr	1.42	1.06	0.97	0.92	0.81	0.75	0.65	0.57	0.49	0.40	0.32	0.26	0.23
SO_3	ppmvd @ 15% O_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO_3	ppmvd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO_3	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM10														
Front Half	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Back Half	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	lb/hr	6.0	5.8	5.8	5.8	5.8	5.8	5.0	5.0	5.0	5.0	5.0	5.0	5.0
OXIDATION CATALYST (per CT/HRSG)														
CO Reduction	% decrease	85	80	80	80	80	80	80	75	70	65	60	50	0
CO	ppmvd @ 15% O_2	1.8	0.8	0.8	0.8	0.8	2.0	30.0	175.0	540.0	630.0	1,200.0	1,800.0	4,000.0
CO	ppmvd	2.9	1.0	1.0	1.0	0.9	2.3	32.4	169.9	439.7	418.3	619.5	694.0	1,433.0
CO	lb/hr	10.0	3.3	3.0	2.8	2.5	5.6	75.9	384.5	1,000.1	956.0	1,422.3	1,727.7	3,306.7
VOC Reduction	% decrease	30	30	30	30	30	30	20	10	0	0	0	0	0
VOC (non-methane, non-ethane)	ppmvd @ 15% O_2	0.4	0.4	0.4	0.8	1.8	1.8	14.0	27.0	62.5	125.0	100.0	92.5	87.5
VOC (non-methane, non-ethane)	ppmvd	0.7	0.5	0.5	1.0	2.0	2.0	15.1	26.2	50.9	83.0	51.6	35.7	31.3
VOC as CH_4	lb/hr	1.3	1.0	0.9	1.6	3.2	2.8	20.3	34.0	66.3	108.6	67.9	50.9	41.4
SO_3 Oxidation	% increase	0	0	0	0	0	0	0	0	0	0	0	0	0
Δ SO_3	ppmvd @ 15% O_2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Δ SO_3	ppmvd	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Δ SO_3	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POST SCR EMISSIONS (per CT/HRSG)														
NO_X	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	15.0	45.0	45.0	45.0	50.0	40.0	30.0
NO_X Removal Efficiency	% decrease	83.7	77.8	77.8	77.8	77.8	77.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NO_X	ppmvd	3.3	2.4	2.4	2.4	2.3	2.3	16.2	43.7	36.6	29.9	25.8	15.4	10.7
NO_X	lb/hr	18.1	13.6	12.5	11.5	10.4	9.2	62.3	162.4	136.9	112.2	97.3	63.1	40.7
NO_X as NO_2 METHOD 19 F Factor	lb/hr	18.4	13.8	12.7	11.9	10.5	9.8	63.5	166.7	142.6	116.8	103.2	68.5	44.3
NH_3	ppmvd @ 15% O_2	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
NH_3	ppmvd	8.17	6.04	5.97	5.96	5.73	5.63	5.39	4.85	4.07	3.32	2.58	1.93	1.79
NH_3	lb/hr	16.8	12.6	11.5	10.6	9.6	8.5	7.7	6.7	5.6	4.6	3.6	2.9	2.5
NH_3	lbmol/hr	1.0	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.1
CO	ppmvd @ 15% O_2	1.8	0.8	0.8	0.8	0.8	2.0	30.0	175.0	540.0	630.0	1200.0	1800.0	4000.0
CO	ppmvd	2.9	1.0	1.0	1.0	0.9	2.3	32.4	169.9	439.7	418.3	619.5	694.0	1433.0
CO	lb/hr	10.0	3.3	3.0	2.8	2.5	5.6	75.9	384.5	1000.1	956.0	1422.3	1727.7	3306.7
VOC	ppmvd @ 15% O_2	0.4	0.4	0.4	0.8	1.8	1.8	14.0	27.0	62.5	125.0	100.0	92.5	87.5
VOC	ppmvd	0.7	0.5	0.5	1.0	2.0	2.0	15.1	26.2	50.9	83.0	51.6	35.7	31.3
VOC	lb/hr	1.3	1.0	0.9	1.6	3.2	2.8	20.3	34.0	66.3	108.6	67.9	50.9	41.4
SO_2	ppmvd @ 15% O_2	0.11	0.11	0.11	0.11	0.11	0.12	0.11	0.11	0.11	0.11	0.12	0.12	0.12
SO_2	ppmvd	0.18	0.14	0.13	0.14	0.13	0.13	0.12	0.11	0.09	0.08	0.06	0.05	0.04
SO_2	lb/hr	1.42	1.06	0.97	0.92	0.81	0.75	0.65	0.57	0.49	0.40	0.32	0.26	0.23
SO_3 Oxidation across SCR	% increase	0	0	0	0	0	0	0	0	0	0	0	0	0
SO_3 Oxidation across SCR	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO_3	ppmvd @ 15% O_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO_3	ppmvd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO_3	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO_3	lbmol/hr	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$(NH_4)_2SO_4$, Ammonium Sulfate	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PM10														
Front Half	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Emissions Summary
Siemens W501F (2 x 2 x 1) Combined Cycle
Natural Gas Operation

SWPC Case		CASE 1	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5	CASE 6	CASE 7	CASE 8	CASE 9	CASE 10	CASE 11	CASE 12
Ambient Conditions		63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH	63°F -65% RH
CT Load		BASE	BASE	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.04	FSNL
Duct Burner		FIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED	UNFIRED
Evap Cooler		off	off	OFF	off	OFF	off	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Front Half	lb/MBtu (HHV)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Front Half	grains/scf	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Front Half	grains/dscf	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Back Half	lb/hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total PM10	lb/hr	6.00	5.75	5.75	5.75	5.75	5.75	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Total PM10	grains/scf	0.0008	0.0008	0.0008	0.0009	0.0010	0.0011	0.0010	0.0010	0.0010	0.0011	0.0011	0.0010	0.0011
Total PM10	grains/dscf	0.0009	0.0009	0.0009	0.0010	0.0011	0.0012	0.0011	0.0011	0.0011	0.0011	0.0011	0.0010	0.0011
Aqueous Ammonia (per CT/HRSG)														
Purity	%	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4
Consumption	lb/hr	174.0	102.7	94.3	86.9	78.4	69.8	26.2	22.7	19.2	15.7	12.3	9.9	8.5
Stack Conditions (per CT/HRSG)														
Internal Diameter	ft	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
Flow	lb/hr	3,820,031	3,792,602	3,523,290	3,248,080	3,043,823	2,753,070	2,580,456	2,477,340	2,470,619	2,464,052	2,457,579	2,647,478	2,450,618
Exit Velocity	ft/s	67.4	66.6	60.9	55.4	51.7	46.5	45.4	43.0	42.2	42.4	42.2	45.4	42.0
Temperature	°F	208.6	208.6	198.7	190.2	187.0	183.9	211.3	202.8	192.9	200.0	200.0	200.0	200.0
Flow	acfm	1,146,262	1,132,303	1,036,497	943,113	879,053	791,247	772,602	731,316	717,046	721,534	718,252	772,081	714,740
Flow	scfm	868,883	858,302	797,544	735,124	688,629	622,784	583,329	559,239	556,641	554,099	551,579	593,170	548,881
Flow	dscfm	775,176	785,346	730,225	673,373	632,230	572,339	537,767	518,973	521,517	524,011	526,479	570,832	529,121

Notes:

MBtu = 10^6 Btu

COLD START

Time	LEAD CTG - INSTANTANEOUS							LAG CTG - INSTANTANEOUS							LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
0:00	Purge	0%	0	0	0	0	0								0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0
0:01	Purge	0%	0	0	0	0	0								0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0
0:02	Purge	0%	0	0	0	0	0								0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0
0:03	Purge	0%	0	0	0	0	0								0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0
0:04	Purge	0%	0	0	0	0	0								0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0
0:05	Purge	0%	0	0	0	0	0								0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0
0:06	Purge	0%	0	0	0	0	0								0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0
0:07	Light Off	0%	33	400	42	0.2	3								4	50	5	0.0	0	0	0	0	0.0	0	4	50	5	0.0	0
0:08	ramp to FSNL	0%	33	400	42	0.2	3								7	89	9	0.1	1	0	0	0	0.0	0	7	89	9	0.1	1
0:09	ramp to FSNL	0%	33	400	42	0.2	3								10	120	13	0.1	1	0	0	0	0.0	0	10	120	13	0.1	1
0:10	ramp to FSNL	0%	33	400	42	0.2	3								12	145	15	0.1	1	0	0	0	0.0	0	12	145	15	0.1	1
0:11	ramp to FSNL	0%	33	400	42	0.2	3								14	167	17	0.1	1	0	0	0	0.0	0	14	167	17	0.1	1
0:12	ramp to FSNL	0%	33	400	42	0.2	3								15	185	19	0.1	2	0	0	0	0.0	0	15	185	19	0.1	2
0:13	ramp to FSNL	0%	33	400	42	0.2	3								17	200	21	0.1	2	0	0	0	0.0	0	17	200	21	0.1	2
0:14	ramp to FSNL	0%	33	400	42	0.2	3								18	213	22	0.1	2	0	0	0	0.0	0	18	213	22	0.1	2
0:15	ramp to FSNL	0%	33	400	42	0.2	3								19	225	23	0.1	2	0	0	0	0.0	0	19	225	23	0.1	2
0:16	ramp to FSNL	0%	33	400	42	0.2	3								20	235	25	0.1	2	0	0	0	0.0	0	20	235	25	0.1	2
0:17	ramp to FSNL	0%	33	400	42	0.2	3								20	244	25	0.1	2	0	0	0	0.0	0	20	244	25	0.1	2
0:18	ramp to FSNL	0%	33	400	42	0.2	3								21	253	26	0.1	2	0	0	0	0.0	0	21	253	26	0.1	2
0:19	ramp to FSNL	0%	33	400	42	0.2	3								22	260	27	0.1	2	0	0	0	0.0	0	22	260	27	0.1	2
0:20	ramp to FSNL	0%	33	400	42	0.2	3								22	267	28	0.2	2	0	0	0	0.0	0	22	267	28	0.2	2
0:21	ramp to FSNL	0%	33	400	42	0.2	3								23	273	28	0.2	2	0	0	0	0.0	0	23	273	28	0.2	2
0:22	ramp to FSNL	0%	33	400	42	0.2	3								23	278	29	0.2	2	0	0	0	0.0	0	23	278	29	0.2	2
0:23	ramp to FSNL	0%	33	400	42	0.2	3								24	283	30	0.2	2	0	0	0	0.0	0	24	283	30	0.2	2
0:24	FSNL	0%	41	3,307	41	0.2	5								24	404	30	0.2	2	0	0	0	0.0	0	24	404	30	0.2	2
0:25	5 MW	3%	52	2,930	47	0.2	5								25	501	31	0.2	3	0	0	0	0.0	0	25	501	31	0.2	3
0:26	10 MW	6%	69	2,365	55	0.3	5								27	570	32	0.2	3	0	0	0	0.0	0	27	570	32	0.2	3
0:27	15 MW	9%	86	1,799	63	0.3	5								29	614	33	0.2	3	0	0	0	0.0	0	29	614	33	0.2	3
0:28	20 MW	12%	99	1,376	72	0.3	5								31	641	34	0.2	3	0	0	0	0.0	0	31	641	34	0.2	3
0:29	20 MW	12%	99	1,376	72	0.3	5								34	665	35	0.2	3	0	0	0	0.0	0	34	665	35	0.2	3
0:30	20 MW	12%	99	1,376	72	0.3	5								36	688	36	0.2	3	0	0	0	0.0	0	36	688	36	0.2	3
0:31	20 MW	12%	99	1,376	72	0.3	5								38	709	38	0.2	3	0	0	0	0.0	0	38	709	38	0.2	3
0:32	20 MW	12%	99	1,376	72	0.3	5								40	730	39	0.2	3	0	0	0	0.0	0	40	730	39	0.2	3
0:33	20 MW	12%	99	1,376	72	0.3	5								41	749	40	0.2	3	0	0	0	0.0	0	41	749	40	0.2	3
0:34	20 MW	12%	99	1,376	72	0.3	5								43	767	40	0.2	3	0	0	0	0.0	0	43	767	40	0.2	3
0:35	20 MW	12%	99	1,376	72	0.3	5								45	783	41	0.2	3	0	0	0	0.0	0	45	783	41	0.2	3
0:36	20 MW	12%	99	1,376	72	0.3	5								46	800	42	0.2	3	0	0	0	0.0	0	46	800	42	0.2	3
0:37	20 MW	12%	99	1,376	72	0.3	5								47	815	43	0.2	3	0	0	0	0.0	0	47	815	43	0.2	3
0:38	20 MW	12%	99	1,376	72	0.3	5								49	829	44	0.2	3	0	0	0	0.0	0	49	829	44	0.2	3
0:39	20 MW	12%	99	1,376	72	0.3	5								50	843	44	0.2	3	0	0	0	0.0	0	50	843	44	0.2	3
0:40	20 MW	12%	99	1,376	72	0.3	5								51	856	45	0.2	3	0	0	0	0.0	0	51	856	45	0.2	3
0:41	20 MW	12%	99	1,376	72	0.3	5								52	868	46	0.2	3	0	0	0	0.0	0	52	868	46	0.2	3
0:42	20 MW	12%	99	1,376	72	0.3	5								53	880	46	0.2	4	0	0	0	0.0	0	53	880	46	0.2	4
0:43	20 MW	12%	99	1,376	72	0.3	5								54	891	47	0.2	4	0	0	0	0.0	0	54	891	47	0.2	4
0:44	20 MW	12%	99	1,376	72	0.3	5								55	902	47	0.2	4	0	0	0	0.0	0	55	902	47	0.2	4
0:45	20 MW	12%	99	1,376	72	0.3	5								56	912	48	0.2	4	0	0	0	0.0	0	56	912	48	0.2	4
0:46	20 MW	12%	99	1,376	72	0.3	5								57	922	49	0.2	4	0	0	0	0.0	0	57	922	49	0.2	4
0:47	20 MW	12%	99	1,376	72	0.3	5								58	932	49	0.2	4	0	0	0	0.0	0	58	932	49	0.2	4
0:48	20 MW	12%	99	1,376	72	0.3	5								59	941	49	0.2	4	0	0	0	0.0	0	59	941	49	0.2	4
0:49	20 MW	12%	99	1,376	72	0.3	5								60	949	50	0.2	4	0	0	0	0.0	0	60	949	50	0.2	4
0:50	20 MW	12%	99	1,376	72	0.3	5								61	958	50	0.2	4	0	0	0	0.0	0	61	958	50	0.2	4
0:51	20 MW	12%	99	1,376	72	0.3	5								61	966	51	0.2	4	0	0	0	0.0	0	61	966	51	0.2	4
0:52	20 MW	12%	99	1,376	72	0.3	5								62	973	51	0.2	4	0	0	0	0.0	0	62	973	51	0.2	4
0:53	20 MW	12%	99	1,376	72	0.3	5								63	981	52	0.2	4	0	0	0	0.0	0	63	981	52	0.2	4
0:54	20 MW	12%	99	1,376	72	0.3	5								63	988	52	0.2	4	0	0	0	0.0	0	63	988	52	0.2	4
0:55	20 MW	12%	99	1,376	72	0.3	5								64	995	52	0.3	4	0	0	0	0.0	0	64	995	52	0.3	4
0:56	20 MW	12%	99	1,376	72	0.3	5								65	1002	53	0.3	4	0	0	0	0.0	0	65	1,002	53	0.3	4
0:57	20 MW	12%	99	1,376	72	0.3	5								65	1008	53	0.3	4	0	0	0	0.0	0	65	1,008	53	0.3	4
0:58	20 MW	12%	99	1,376	72	0.3	5								66	1014	53	0.3	4	0	0	0	0.0	0	66	1,014	53	0.3	4
0:59	20 MW	12%	99	1,376	72	0.3	5								66	1020	54	0.3	4	0	0	0	0.0	0	66	1,020	54	0.3	4
1:00	20 MW	12%	99	1,376	72	0.3	5	Purge	0%	0	0	0	0	0	67	1,026	54	0.3	4	0	0	0	0.0	0	67	1,026	54	0.3	4
1:01	20 MW	12%	99	1,376	72	0.3	5	Purge	0%	0	0	0	0	0	68	1,049	55	0.3	4	0	0	0	0.0	0	68	1,049	55	0.3	4
1:02	20 MW	12%	99	1,376	72	0.3	5	Purge	0%	0	0	0	0	0	70	1,071	56	0.3	4	0	0	0	0.0	0	70	1,071	56	0.3	4
1:03	20 MW	12%	99	1,376	72	0.3	5	Purge	0%	0	0	0	0	0	72	1,094	57	0.3	4	0	0	0	0.0	0	72	1,094	57	0.3	4
1:04	20 MW	12%	99	1,376	72	0.3	5	Purge	0%	0	0	0	0	0	73	1,116	59	0.3	4	0	0	0	0.0	0	73	1,116	59	0.3	4
1:05	20 MW	12%	99	1,376	72	0.3	5	Purge	0%	0	0	0	0	0	75	1,139	60	0.3	4	0	0	0	0.0	0	75	1,139	60	0.3	4
1:06	20 MW	12%	99	1,376	72	0.3	5	Purge	0%	0	0	0	0	0	77	1,162	61	0.3	4	0	0	0	0.0	0	77	1,162	61	0.3	4

COLD START

Time	LEAD CTG - INSTANTANEOUS							LAG CTG - INSTANTANEOUS							LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
1:07	20 MW	12%	99	1,376	72	0.3	5	Light Off	0%	33	400	42	0.2	3	78	1,184	62	0.3	5	4	50	5	0.0	0	82	1,234	67	0.3	5
1:08	24 MW	14%	103	1,236	84	0.4	5	ramp to FSNL	0%	33	400	42	0.2	3	79	1,198	63	0.3	5	7	89	9	0.1	1	87	1,287	72	0.3	5
1:09	28 MW	16%	106	1,143	92	0.4	5	ramp to FSNL	0%	33	400	42	0.2	3	80	1,210	64	0.3	5	10	120	13	0.1	1	90	1,330	76	0.4	6
1:10	32 MW	19%	109	1,049	100	0.4	5	ramp to FSNL	0%	33	400	42	0.2	3	82	1,221	65	0.3	5	12	145	15	0.1	1	94	1,366	80	0.4	6
1:11	36 MW	21%	115	960	104	0.4	5	ramp to FSNL	0%	33	400	42	0.2	3	83	1,230	66	0.3	5	14	167	17	0.1	1	97	1,396	83	0.4	6
1:12	40 MW	24%	120	969	96	0.4	5	ramp to FSNL	0%	33	400	42	0.2	3	84	1,239	67	0.3	5	15	185	19	0.1	2	100	1,424	86	0.4	6
1:13	44 MW	26%	112	956	109	0.4	5	ramp to FSNL	0%	33	400	42	0.2	3	86	1,248	68	0.3	5	17	200	21	0.1	2	102	1,448	89	0.4	6
1:14	48 MW	28%	132	991	75	0.5	5	ramp to FSNL	0%	33	400	42	0.2	3	87	1,258	68	0.3	5	18	213	22	0.1	2	105	1,471	90	0.4	7
1:15	52 MW	31%	137	1,000	66	0.5	5	ramp to FSNL	0%	33	400	42	0.2	3	89	1,268	69	0.3	5	19	225	23	0.1	2	108	1,493	92	0.4	7
1:16	56 MW	33%	142	877	60	0.5	5	ramp to FSNL	0%	33	400	42	0.2	3	91	1,276	69	0.3	5	20	235	25	0.1	2	110	1,511	93	0.5	7
1:17	60 MW	35%	150	692	50	0.5	5	ramp to FSNL	0%	33	400	42	0.2	3	93	1,280	69	0.3	5	20	244	25	0.1	2	113	1,525	95	0.5	7
1:18	64 MW	38%	155	569	44	0.5	5	ramp to FSNL	0%	33	400	42	0.2	3	95	1,283	69	0.3	5	21	253	26	0.1	2	116	1,536	95	0.5	7
1:19	68 MW	40%	162	384	34	0.6	5	ramp to FSNL	0%	33	400	42	0.2	3	97	1,283	69	0.3	5	22	260	27	0.1	2	119	1,543	96	0.5	7
1:20	72 MW	42%	142	323	31	0.6	5	ramp to FSNL	0%	33	400	42	0.2	3	99	1,282	69	0.3	5	22	267	28	0.2	2	121	1,548	97	0.5	7
1:21	76 MW	45%	122	261	28	0.6	5	ramp to FSNL	0%	33	400	42	0.2	3	100	1,279	69	0.4	5	23	273	28	0.2	2	123	1,552	97	0.5	7
1:22	80 MW	47%	92	168	24	0.6	5	ramp to FSNL	0%	33	400	42	0.2	3	101	1,276	68	0.4	5	23	278	29	0.2	2	124	1,554	97	0.5	7
1:23	84 MW	49%	72	107	22	0.6	5	ramp to FSNL	0%	33	400	42	0.2	3	102	1,271	68	0.4	5	24	283	30	0.2	2	125	1,554	97	0.5	7
1:24	88 MW	52%	57	69	19	0.7	5	FSNL	0%	41	3,307	41	0.2	5	102	1,265	68	0.4	5	24	404	30	0.2	2	126	1,670	98	0.5	7
1:25	92 MW	54%	41	48	13	0.7	5	5 MW	3%	52	2,930	47	0.2	5	102	1,212	67	0.4	5	25	501	31	0.2	3	127	1,713	98	0.5	8
1:26	96 MW	56%	30	34	10	0.7	5	10 MW	6%	69	2,365	55	0.3	5	102	1,164	67	0.4	5	27	570	32	0.2	3	129	1,735	98	0.6	8
1:27	100 MW	59%	20	20	6	0.7	6	15 MW	9%	86	1,799	63	0.3	5	101	1,126	66	0.4	5	29	614	33	0.2	3	130	1,740	98	0.6	8
1:28	104 MW	61%	9	5	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	100	1,097	65	0.4	5	31	641	34	0.2	3	131	1,737	99	0.6	8
1:29	108 MW	64%	10	5	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	98	1,074	64	0.4	5	34	665	35	0.2	3	132	1,739	99	0.6	8
1:30	112 MW	66%	10	4	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	97	1,052	62	0.4	5	36	688	36	0.2	3	133	1,740	99	0.6	8
1:31	116 MW	68%	10	3	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	95	1,029	61	0.4	5	38	709	38	0.2	3	133	1,739	99	0.6	8
1:32	120 MW	71%	10	3	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	94	1,007	60	0.4	5	40	730	39	0.2	3	134	1,736	99	0.6	8
1:33	124 MW	73%	10	3	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	92	984	59	0.4	5	41	749	40	0.2	3	134	1,733	99	0.6	8
1:34	128 MW	75%	10	3	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	91	962	58	0.4	5	43	767	40	0.2	3	134	1,728	98	0.7	8
1:35	132 MW	78%	10	3	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	90	939	57	0.5	5	45	783	41	0.2	3	134	1,723	98	0.7	8
1:36	136 MW	80%	12	3	2	0.9	6	20 MW	12%	99	1,376	72	0.3	5	88	917	56	0.5	5	46	800	42	0.2	3	134	1,716	98	0.7	8
1:37	140 MW	82%	12	3	2	0.9	6	20 MW	12%	99	1,376	72	0.3	5	87	894	55	0.5	5	47	815	43	0.2	3	134	1,709	98	0.7	8
1:38	144 MW	85%	12	3	2	0.9	6	20 MW	12%	99	1,376	72	0.3	5	85	872	53	0.5	5	49	829	44	0.2	3	134	1,701	97	0.7	9
1:39	148 MW	87%	12	3	2	0.9	6	20 MW	12%	99	1,376	72	0.3	5	84	849	52	0.5	5	50	843	44	0.2	3	134	1,692	97	0.7	9
1:40	152 MW	89%	12	3	2	0.9	6	20 MW	12%	99	1,376	72	0.3	5	82	827	51	0.5	5	51	856	45	0.2	3	134	1,682	96	0.7	9
1:41	156 MW	92%	12	3	1	1.0	6	20 MW	12%	99	1,376	72	0.3	5	81	804	50	0.5	5	52	868	46	0.2	3	133	1,672	96	0.7	9
1:42	160 MW	94%	12	3	1	1.0	6	20 MW	12%	99	1,376	72	0.3	5	80	782	49	0.5	5	53	880	46	0.2	4	133	1,661	95	0.8	9
1:43	164 MW	96%	12	3	1	1.0	6	20 MW	12%	99	1,376	72	0.3	5	78	759	48	0.5	5	54	891	47	0.2	4	133	1,650	95	0.8	9
1:44	168 MW	99%	12	3	1	1.0	6	20 MW	12%	99	1,376	72	0.3	5	77	737	46	0.5	5	55	902	47	0.2	4	132	1,638	94	0.8	9
1:45	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	75	714	45	0.6	5	56	912	48	0.2	4	132	1,626	93	0.8	9
1:46	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	74	692	44	0.6	5	57	922	49	0.2	4	131	1,614	93	0.8	9
1:47	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	73	669	43	0.6	5	58	932	49	0.2	4	131	1,601	92	0.8	9
1:48	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	71	647	42	0.6	5	59	941	49	0.2	4	130	1,587	91	0.8	9
1:49	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	70	624	41	0.6	5	60	949	50	0.2	4	130	1,573	91	0.8	9
1:50	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	68	602	39	0.6	5	61	958	50	0.2	4	129	1,559	90	0.9	9
1:51	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	67	579	38	0.6	5	61	966	51	0.2	4	128	1,545	89	0.9	9
1:52	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	66	557	37	0.6	5	62	973	51	0.2	4	128	1,530	88	0.9	9
1:53	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	64	534	36	0.7	5	63	981	52	0.2	4	127	1,515	88	0.9	9
1:54	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	63	512	35	0.7	5	63	988	52	0.2	4	126	1,500	87	0.9	9
1:55	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	61	489	34	0.7	5	64	995	52	0.3	4	125	1,484	86	0.9	9
1:56	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	60	467	32	0.7	5	65	1,002	53	0.3	4	125	1,468	85	0.9	9
1:57	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	59	444	31	0.7	5	65	1,008	53	0.3	4	124	1,452	84	1.0	9
1:58	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	57	422	30	0.7	5	66	1,014	53	0.3	4	123	1,436	83	1.0	9
1:59	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	56	399	29	0.7	5	66	1,020	54	0.3	4	122	1,419	83	1.0	9
2:00	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	54	377	28	0.7	5	68	1043	55	0.3	4	122	1,420	83	1.0	9
2:01	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	53	354	27	0.8	5	70	1066	56	0.3	4	123	1,420	83	1.0	10
2:02	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	52	332	25	0.8	5	71	1089	57	0.3	4	123	1,421	83	1.0	10
2:03	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	50	309	24	0.8	5	73	1112	58	0.3	4	123	1,421	83	1.1	10
2:04	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	49	287	23	0.8	5	75	1135	60	0.3	4	123	1,422	83	1.1	10
2:05	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	47	264	22	0.8	5	76	1158	61	0.3	4	124	1,422	83	1.1	10
2:06	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	46	242	21	0.8	6	78	1181	62	0.3	5	124	1,422	83	1.1	10
2:07	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	45	219	20	0.8	6	79	1197	63	0.3	5	123	1,416	82	1.1	10
2:08	170 MW	100%	14	3	1	1.1	6	24 MW	14%	103	1,236	84	0.4	5	43	197	19	0.8	6	80	1211	63	0.3	5	123	1,408	82	1.1	10
2:09	170 MW	100%	14	3	1	1.1	6	28 MW	16%	106	1,143	92	0.4	5	42	176	17	0.8	6	81	1223	64	0.3	5	123	1,400	81	1.1	10
2:10	170 MW	100%	14	3	1	1.1	6	32 MW	19%	109	1,049	100	0.4	5	40	158	16	0.9	6	83	1234	65	0.3	5	123	1,392	81	1.2	10
2:11	170 MW	100%	14	3	1	1.1	6	36 MW	21%	115	960	104	0.4	5	39	141	14	0.9	6	84	1244	66	0.3	5	123	1,384	80	1.2	10
2:12	170 MW	100%	14	3	1	1.1	6	40 MW	24%	120	969	96	0.4	5	37	125	12	0.9	6	85	1253	67	0.3	5	122	1,378	79	1.2	10
2:13	170 MW	100%	14	3	1	1.1	6	44 MW	26%	112	956	109	0.4	5	35	109	11	0.9	6	87	1262	68	0.3	5	122	1,371	79	1.2	10

COLD START

Time	LEAD CTG - INSTANTANEOUS							LAG CTG - INSTANTANEOUS							LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
2:14	170 MW	100%	14	3	1	1.1	6	48 MW	28%	132	991	75	0.5	5	34	93	9	0.9	6	88	1272	69	0.3	5	122	1,366	78	1.2	10
2:15	170 MW	100%	14	3	1	1.1	6	52 MW	31%	137	1,000	66	0.5	5	32	77	8	0.9	6	90	1282	69	0.3	5	122	1,359	77	1.2	10
2:16	170 MW	100%	14	3	1	1.1	6	56 MW	33%	142	877	60	0.5	5	30	61	7	0.9	6	92	1290	69	0.3	5	121	1,351	76	1.2	10
2:17	170 MW	100%	14	3	1	1.1	6	60 MW	35%	150	692	50	0.5	5	28	47	6	0.9	6	94	1295	70	0.3	5	121	1,342	75	1.3	10
2:18	170 MW	100%	14	3	1	1.1	6	64 MW	38%	155	569	44	0.5	5	25	35	5	0.9	6	96	1298	70	0.3	5	121	1,333	74	1.3	11
2:19	170 MW	100%	14	3	1	1.1	6	68 MW	40%	162	384	34	0.6	5	23	26	4	0.9	6	98	1298	69	0.3	5	121	1,324	74	1.3	11
2:20	170 MW	100%	14	3	1	1.1	6	72 MW	42%	142	323	31	0.6	5	21	20	4	1.0	6	100	1296	69	0.3	5	120	1,316	73	1.3	11
2:21	170 MW	100%	14	3	1	1.1	6	76 MW	45%	122	261	28	0.6	5	18	14	3	1.0	6	101	1294	69	0.4	5	120	1,308	72	1.3	11
2:22	170 MW	100%	14	3	1	1.1	6	80 MW	47%	92	168	24	0.6	5	17	10	3	1.0	6	102	1290	69	0.4	5	119	1,300	71	1.3	11
2:23	170 MW	100%	14	3	1	1.1	6	84 MW	49%	72	107	22	0.6	5	15	8	2	1.0	6	103	1285	68	0.4	5	118	1,293	71	1.3	11
2:24	170 MW	100%	14	3	1	1.1	6	88 MW	52%	57	69	19	0.7	5	14	6	2	1.0	6	103	1231	68	0.4	5	118	1,237	70	1.4	11
2:25	170 MW	100%	14	3	1	1.1	6	92 MW	54%	41	48	13	0.7	5	14	5	2	1.0	6	103	1183	67	0.4	5	117	1,188	69	1.4	11
2:26	170 MW	100%	14	3	1	1.1	6	96 MW	56%	30	34	10	0.7	5	13	4	2	1.0	6	102	1144	67	0.4	5	116	1,148	68	1.4	11
2:27	170 MW	100%	14	3	1	1.1	6	100 MW	59%	20	20	6	0.7	6	13	4	1	1.0	6	101	1115	66	0.4	5	114	1,118	67	1.4	11
2:28	170 MW	100%	14	3	1	1.1	6	104 MW	61%	9	5	3	0.8	6	13	3	1	1.0	6	100	1092	65	0.4	5	113	1,095	66	1.4	11
2:29	170 MW	100%	14	3	1	1.1	6	108 MW	64%	10	5	3	0.8	6	13	3	1	1.0	6	98	1069	63	0.4	5	111	1,072	65	1.4	11
2:30	170 MW	100%	14	3	1	1.1	6	112 MW	66%	10	4	3	0.8	6	13	3	1	1.0	6	97	1046	62	0.4	5	110	1,049	64	1.4	11
2:31	170 MW	100%	14	3	1	1.1	6	116 MW	68%	10	3	3	0.8	6	13	3	1	1.0	6	95	1023	61	0.4	5	108	1,027	62	1.4	11
2:32	170 MW	100%	14	3	1	1.1	6	120 MW	71%	10	3	3	0.8	6	13	3	1	1.0	6	94	1000	60	0.4	5	107	1,004	61	1.5	11
2:33	170 MW	100%	14	3	1	1.1	6	124 MW	73%	10	3	3	0.8	6	13	3	1	1.0	6	92	978	59	0.4	5	106	981	60	1.5	11
2:34	170 MW	100%	14	3	1	1.1	6	128 MW	75%	10	3	3	0.8	6	13	3	1	1.0	6	91	955	58	0.4	5	104	958	59	1.5	11
2:35	170 MW	100%	14	3	1	1.1	6	132 MW	78%	10	3	3	0.8	6	13	3	1	1.0	6	89	932	57	0.5	5	103	935	58	1.5	11
2:36	170 MW	100%	14	3	1	1.1	6	136 MW	80%	12	3	2	0.9	6	13	3	1	1.0	6	88	909	55	0.5	5	101	912	56	1.5	11
2:37	170 MW	100%	14	3	1	1.1	6	140 MW	82%	12	3	2	0.9	6	13	3	1	1.0	6	86	886	54	0.5	5	100	889	55	1.5	11
2:38	170 MW	100%	14	3	1	1.1	6	144 MW	85%	12	3	2	0.9	6	13	3	1	1.1	6	85	863	53	0.5	5	98	866	54	1.5	11
2:39	170 MW	100%	14	3	1	1.1	6	148 MW	87%	12	3	2	0.9	6	13	3	1	1.1	6	84	840	52	0.5	5	97	844	53	1.5	11
2:40	170 MW	100%	14	3	1	1.1	6	152 MW	89%	12	3	2	0.9	6	13	3	1	1.1	6	82	817	51	0.5	5	96	821	52	1.6	11
2:41	170 MW	100%	14	3	1	1.1	6	156 MW	92%	12	3	1	1.0	6	14	3	1	1.1	6	81	794	50	0.5	5	94	798	51	1.6	11
2:42	170 MW	100%	14	3	1	1.1	6	160 MW	94%	12	3	1	1.0	6	14	3	1	1.1	6	79	772	48	0.5	5	93	775	49	1.6	11
2:43	170 MW	100%	14	3	1	1.1	6	164 MW	96%	12	3	1	1.0	6	14	3	1	1.1	6	78	749	47	0.5	5	91	752	48	1.6	11
2:44	170 MW	100%	14	3	1	1.1	6	168 MW	99%	12	3	1	1.0	6	14	3	1	1.1	6	76	726	46	0.6	5	90	729	47	1.6	11
2:45	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	75	703	45	0.6	5	89	706	46	1.6	11
2:46	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	74	680	44	0.6	5	87	683	45	1.6	11
2:47	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	72	657	42	0.6	5	86	661	43	1.7	11
2:48	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	71	634	41	0.6	5	84	638	42	1.7	11
2:49	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	69	611	40	0.6	5	83	615	41	1.7	11
2:50	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	68	589	39	0.6	5	81	592	40	1.7	11
2:51	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	66	566	38	0.6	5	80	569	39	1.7	11
2:52	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	65	543	37	0.6	5	79	546	38	1.7	11
2:53	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	64	520	35	0.7	5	77	523	36	1.7	11
2:54	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	62	497	34	0.7	5	76	500	35	1.7	11
2:55	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	61	474	33	0.7	5	74	478	34	1.7	11
2:56	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	59	451	32	0.7	5	73	455	33	1.8	11
2:57	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	58	429	31	0.7	5	71	432	32	1.8	11
2:58	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	56	406	29	0.7	5	70	409	30	1.8	11
2:59	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	55	383	28	0.7	5	69	386	29	1.8	11
3:00	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	54	360	27	0.7	5	67	363	28	1.8	11
3:01	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	52	337	26	0.8	5	66	340	27	1.8	11
3:02	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	51	314	25	0.8	5	64	317	26	1.8	11
3:03	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	49	291	24	0.8	5	63	295	25	1.8	11
3:04	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	48	268	22	0.8	5	62	272	23	1.9	11
3:05	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	47	246	21	0.8	5	60	249	22	1.9	11
3:06	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	45	223	20	0.8	6	59	226	21	1.9	11
3:07	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	44	200	19	0.8	6	57	203	20	1.9	11
3:08	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	42	179	17	0.8	6	56	183	18	1.9	11
3:09	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	41	160	16	0.9	6	54	164	17	1.9	11
3:10	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	39	143	14	0.9	6	53	146	15	1.9	11
3:11	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	37	127	13	0.9	6	51	130	13	1.9	11
3:12	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	36	111	11	0.9	6	49	114	12	2.0	11
3:13	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	34	95	9	0.9	6	48	98	10	2.0	11
3:14	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	32	78	8	0.9	6	46	82	9	2.0	11
3:15	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	30	62	7	0.9	6	44	65	8	2.0	11
3:16	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	28	47	6	0.9	6	41	51	7	2.0	11
3:17	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	26	36	5	0.9	6	39	39	6	2.0	11
3:18	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	23	26	4	0.9	6	37	30	5	2.0	11
3:19	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	21	20	4	1.0	6	34	23	5	2.0	11
3:20	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	19	15	3	1.0	6	32	18	4	2.0	11

COLD START

Time	LEAD CTG - INSTANTANEOUS							LAG CTG - INSTANTANEOUS							LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
3:21	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	17	10	3	1.0	6	30	14	4	2.0	11
3:22	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	15	8	2	1.0	6	29	11	3	2.0	11
3:23	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	6	2	1.0	6	28	9	3	2.0	11
3:24	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	5	2	1.0	6	27	8	3	2.1	11
3:25	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	13	4	2	1.0	6	27	7	3	2.1	11
3:26	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	13	4	1	1.0	6	27	7	2	2.1	11
3:27	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	13	3	1	1.0	6	26	7	2	2.1	12
3:28	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	13	3	1	1.0	6	27	7	2	2.1	12
3:29	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	13	3	1	1.0	6	27	7	2	2.1	12
3:30	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	13	3	1	1.0	6	27	7	2	2.1	12

		NO_X	CO	VOC	SO_2	PM_{10}		NO_X	CO	VOC	SO_2	PM_{10}		NO_X	CO	VOC	SO_2	PM_{10}
LEAD	lb	128	1,405	82	2	12	**LAG**	115	1,402	81	0.5	6	**MAX**	134	1,740	99	2.1	12
TOTAL	lb	243	2,806	163	2.0	19												
	ton	0.1	1.4	0.1	0.0	0.0												

Notes
1) Emissions during 150 minunte cold start-up highlighted in gray
2) Cold-start duration defined as the time needed for both CTGs to ramp to a load > 60%
3) Emissions during normal operation (> 60% CTG load) shown for purposes of evaluating worst case 1-hr emission rates

WARM START

Time	LEAD CTG - INSTANTANEOUS							LAG CTG - INSTANTANEOUS							LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
0:00	Purge	0%	0	0	0	0	0								0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0
0:01	Purge	0%	0	0	0	0	0								0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0
0:02	Purge	0%	0	0	0	0	0								0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0
0:03	Purge	0%	0	0	0	0	0								0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0
0:04	Purge	0%	0	0	0	0	0								0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0
0:05	Purge	0%	0	0	0	0	0								0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0
0:06	Purge	0%	0	0	0	0	0								0	0	0	0.0	0	0	0	0	0.0	0	0	0	0	0.0	0
0:07	Light Off	0%	33	400	42	0.2	3								4	50	5	0.0	0	0	0	0	0.0	0	4	50	5	0.0	0
0:08	ramp to FSNL	0%	33	400	42	0.2	3								7	89	9	0.1	1	0	0	0	0.0	0	7	89	9	0.1	1
0:09	ramp to FSNL	0%	33	400	42	0.2	3								10	120	13	0.1	1	0	0	0	0.0	0	10	120	13	0.1	1
0:10	ramp to FSNL	0%	33	400	42	0.2	3								12	145	15	0.1	1	0	0	0	0.0	0	12	145	15	0.1	1
0:11	ramp to FSNL	0%	33	400	42	0.2	3								14	167	17	0.1	1	0	0	0	0.0	0	14	167	17	0.1	1
0:12	ramp to FSNL	0%	33	400	42	0.2	3								15	185	19	0.1	2	0	0	0	0.0	0	15	185	19	0.1	2
0:13	ramp to FSNL	0%	33	400	42	0.2	3								17	200	21	0.1	2	0	0	0	0.0	0	17	200	21	0.1	2
0:14	ramp to FSNL	0%	33	400	42	0.2	3								18	213	22	0.1	2	0	0	0	0.0	0	18	213	22	0.1	2
0:15	ramp to FSNL	0%	33	400	42	0.2	3								19	225	23	0.1	2	0	0	0	0.0	0	19	225	23	0.1	2
0:16	ramp to FSNL	0%	33	400	42	0.2	3								20	235	25	0.1	2	0	0	0	0.0	0	20	235	25	0.1	2
0:17	ramp to FSNL	0%	33	400	42	0.2	3								20	244	25	0.1	2	0	0	0	0.0	0	20	244	25	0.1	2
0:18	ramp to FSNL	0%	33	400	42	0.2	3								21	253	26	0.1	2	0	0	0	0.0	0	21	253	26	0.1	2
0:19	ramp to FSNL	0%	33	400	42	0.2	3								22	260	27	0.1	2	0	0	0	0.0	0	22	260	27	0.1	2
0:20	ramp to FSNL	0%	33	400	42	0.2	3								22	267	28	0.2	2	0	0	0	0.0	0	22	267	28	0.2	2
0:21	ramp to FSNL	0%	33	400	42	0.2	3								23	273	28	0.2	2	0	0	0	0.0	0	23	273	28	0.2	2
0:22	ramp to FSNL	0%	33	400	42	0.2	3								23	278	29	0.2	2	0	0	0	0.0	0	23	278	29	0.2	2
0:23	ramp to FSNL	0%	33	400	42	0.2	3								24	283	30	0.2	2	0	0	0	0.0	0	24	283	30	0.2	2
0:24	FSNL	0%	41	3,307	41	0.2	5								24	404	30	0.2	2	0	0	0	0.0	0	24	404	30	0.2	2
0:25	5 MW	3%	52	2,930	47	0.2	5								25	501	31	0.2	3	0	0	0	0.0	0	25	501	31	0.2	3
0:26	10 MW	6%	69	2,365	55	0.3	5								27	570	32	0.2	3	0	0	0	0.0	0	27	570	32	0.2	3
0:27	15 MW	9%	86	1,799	63	0.3	5								29	614	33	0.2	3	0	0	0	0.0	0	29	614	33	0.2	3
0:28	20 MW	12%	99	1,376	72	0.3	5								31	641	34	0.2	3	0	0	0	0.0	0	31	641	34	0.2	3
0:29	20 MW	12%	99	1,376	72	0.3	5								34	665	35	0.2	3	0	0	0	0.0	0	34	665	35	0.2	3
0:30	20 MW	12%	99	1,376	72	0.3	5								36	688	36	0.2	3	0	0	0	0.0	0	36	688	36	0.2	3
0:31	20 MW	12%	99	1,376	72	0.3	5								38	709	38	0.2	3	0	0	0	0.0	0	38	709	38	0.2	3
0:32	20 MW	12%	99	1,376	72	0.3	5								40	730	39	0.2	3	0	0	0	0.0	0	40	730	39	0.2	3
0:33	20 MW	12%	99	1,376	72	0.3	5								41	749	40	0.2	3	0	0	0	0.0	0	41	749	40	0.2	3
0:34	20 MW	12%	99	1,376	72	0.3	5								43	767	40	0.2	3	0	0	0	0.0	0	43	767	40	0.2	3
0:35	20 MW	12%	99	1,376	72	0.3	5								45	783	41	0.2	3	0	0	0	0.0	0	45	783	41	0.2	3
0:36	20 MW	12%	99	1,376	72	0.3	5								46	800	42	0.2	3	0	0	0	0.0	0	46	800	42	0.2	3
0:37	20 MW	12%	99	1,376	72	0.3	5								47	815	43	0.2	3	0	0	0	0.0	0	47	815	43	0.2	3
0:38	20 MW	12%	99	1,376	72	0.3	5								49	829	44	0.2	3	0	0	0	0.0	0	49	829	44	0.2	3
0:39	20 MW	12%	99	1,376	72	0.3	5								50	843	44	0.2	3	0	0	0	0.0	0	50	843	44	0.2	3
0:40	20 MW	12%	99	1,376	72	0.3	5								51	856	45	0.2	3	0	0	0	0.0	0	51	856	45	0.2	3
0:41	20 MW	12%	99	1,376	72	0.3	5								52	868	46	0.2	3	0	0	0	0.0	0	52	868	46	0.2	3
0:42	20 MW	12%	99	1,376	72	0.3	5								53	880	46	0.2	4	0	0	0	0.0	0	53	880	46	0.2	4
0:43	20 MW	12%	99	1,376	72	0.3	5								54	891	47	0.2	4	0	0	0	0.0	0	54	891	47	0.2	4
0:44	20 MW	12%	99	1,376	72	0.3	5								55	902	47	0.2	4	0	0	0	0.0	0	55	902	47	0.2	4
0:45	20 MW	12%	99	1,376	72	0.3	5	Purge	0%	0	0	0	0	0	56	912	48	0.2	4	0	0	0	0.0	0	56	912	48	0.2	4
0:46	20 MW	12%	99	1,376	72	0.3	5	Purge	0%	0	0	0	0	0	57	922	49	0.2	4	0	0	0	0.0	0	57	922	49	0.2	4
0:47	20 MW	12%	99	1,376	72	0.3	5	Purge	0%	0	0	0	0	0	58	932	49	0.2	4	0	0	0	0.0	0	58	932	49	0.2	4
0:48	20 MW	12%	99	1,376	72	0.3	5	Purge	0%	0	0	0	0	0	59	941	49	0.2	4	0	0	0	0.0	0	59	941	49	0.2	4
0:49	20 MW	12%	99	1,376	72	0.3	5	Purge	0%	0	0	0	0	0	60	949	50	0.2	4	0	0	0	0.0	0	60	949	50	0.2	4
0:50	20 MW	12%	99	1,376	72	0.3	5	Purge	0%	0	0	0	0	0	61	958	50	0.2	4	0	0	0	0.0	0	61	958	50	0.2	4
0:51	20 MW	12%	99	1,376	72	0.3	5	Purge	0%	0	0	0	0	0	61	966	51	0.2	4	0	0	0	0.0	0	61	966	51	0.2	4
0:52	20 MW	12%	99	1,376	72	0.3	5	Light Off	0%	33	400	42	0.2	3	62	973	51	0.2	4	4	50	5	0.0	0	66	1,023	56	0.3	4
0:53	20 MW	12%	99	1,376	72	0.3	5	ramp to FSNL	0%	33	400	42	0.2	3	63	981	52	0.2	4	7	89	9	0.1	1	70	1,070	61	0.3	5
0:54	20 MW	12%	99	1,376	72	0.3	5	ramp to FSNL	0%	33	400	42	0.2	3	63	988	52	0.2	4	10	120	13	0.1	1	73	1,108	64	0.3	5
0:55	20 MW	12%	99	1,376	72	0.3	5	ramp to FSNL	0%	33	400	42	0.2	3	64	995	52	0.3	4	12	145	15	0.1	1	76	1,140	67	0.3	5
0:56	20 MW	12%	99	1,376	72	0.3	5	ramp to FSNL	0%	33	400	42	0.2	3	65	1002	53	0.3	4	14	167	17	0.1	1	78	1,168	70	0.3	5
0:57	20 MW	12%	99	1,376	72	0.3	5	ramp to FSNL	0%	33	400	42	0.2	3	65	1008	53	0.3	4	15	185	19	0.1	2	81	1,193	72	0.4	5
0:58	25 MW	15%	103	1,236	84	0.4	5	ramp to FSNL	0%	33	400	42	0.2	3	66	1012	54	0.3	4	17	200	21	0.1	2	82	1,212	74	0.4	6
0:59	30 MW	18%	108	1,096	96	0.4	5	ramp to FSNL	0%	33	400	42	0.2	3	67	1013	54	0.3	4	18	213	22	0.1	2	84	1,227	76	0.4	6
1:00	35 MW	21%	112	956	109	0.4	5	ramp to FSNL	0%	33	400	42	0.2	3	68	1029	56	0.3	4	19	225	23	0.1	2	87	1,254	79	0.4	6
1:01	40 MW	24%	120	969	96	0.4	5	ramp to FSNL	0%	33	400	42	0.2	3	70	1045	58	0.3	4	20	235	25	0.1	2	90	1,281	82	0.4	6
1:02	45 MW	26%	127	982	83	0.5	5	ramp to FSNL	0%	33	400	42	0.2	3	72	1062	59	0.3	4	20	244	25	0.1	2	93	1,306	84	0.4	6
1:03	50 MW	29%	134	996	71	0.5	5	ramp to FSNL	0%	33	400	42	0.2	3	75	1078	60	0.3	4	21	253	26	0.1	2	96	1,331	87	0.4	6
1:04	55 MW	32%	142	877	60	0.5	5	ramp to FSNL	0%	33	400	42	0.2	3	77	1093	61	0.3	4	22	260	27	0.1	2	99	1,353	88	0.4	7

WARM START

Time	LEAD CTG - INSTANTANEOUS							LAG CTG - INSTANTANEOUS							LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
1:05	60 MW	35%	150	692	50	0.5	5	ramp to FSNL	0%	33	400	42	0.2	3	80	1105	62	0.3	4	22	267	28	0.2	2	102	1,371	90	0.5	7
1:06	65 MW	38%	157	508	40	0.6	5	ramp to FSNL	0%	33	400	42	0.2	3	82	1113	63	0.3	5	23	273	28	0.2	2	105	1,386	91	0.5	7
1:07	70 MW	41%	152	354	33	0.6	5	ramp to FSNL	0%	33	400	42	0.2	3	84	1112	63	0.3	5	23	278	29	0.2	2	107	1,391	92	0.5	7
1:08	75 MW	44%	122	261	28	0.6	5	ramp to FSNL	0%	33	400	42	0.2	3	86	1110	62	0.3	5	24	283	30	0.2	2	109	1,393	92	0.5	7
1:09	80 MW	47%	92	168	24	0.6	5	FSNL	0%	41	3,307	41	0.2	5	87	1106	62	0.3	5	24	404	30	0.2	2	111	1,510	92	0.5	7
1:10	85 MW	50%	62	76	20	0.7	5	5 MW	3%	52	2,930	47	0.2	5	87	1101	62	0.3	5	25	501	31	0.2	3	112	1,602	92	0.5	7
1:11	90 MW	53%	52	62	17	0.7	5	10 MW	6%	69	2,365	55	0.3	5	87	1095	61	0.3	5	27	570	32	0.2	3	114	1,665	93	0.5	7
1:12	95 MW	56%	36	41	12	0.7	5	15 MW	9%	86	1,799	63	0.3	5	87	1089	61	0.4	5	29	614	33	0.2	3	117	1,703	93	0.5	7
1:13	100 MW	59%	20	20	6	0.7	6	20 MW	12%	99	1,376	72	0.3	5	87	1083	60	0.4	5	31	641	34	0.2	3	119	1,723	94	0.5	8
1:14	105 MW	62%	9	5	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	87	1076	60	0.4	5	34	665	35	0.2	3	121	1,741	95	0.6	8
1:15	110 MW	65%	10	4	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	86	1070	59	0.4	5	36	688	36	0.2	3	122	1,758	95	0.6	8
1:16	115 MW	68%	10	3	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	86	1063	58	0.4	5	38	709	38	0.2	3	124	1,772	96	0.6	8
1:17	120 MW	71%	10	3	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	86	1056	58	0.4	5	40	730	39	0.2	3	125	1,786	96	0.6	8
1:18	125 MW	74%	10	3	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	85	1050	57	0.4	5	41	749	40	0.2	3	127	1,798	97	0.6	8
1:19	130 MW	76%	10	3	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	85	1043	56	0.4	5	43	767	40	0.2	3	128	1,810	97	0.6	8
1:20	135 MW	79%	10	3	3	0.8	6	20 MW	12%	99	1,376	72	0.3	5	85	1036	56	0.4	5	45	783	41	0.2	3	129	1,820	97	0.6	8
1:21	140 MW	82%	12	3	2	0.9	6	20 MW	12%	99	1,376	72	0.3	5	84	1030	55	0.4	5	46	800	42	0.2	3	130	1,829	97	0.7	8
1:22	145 MW	85%	12	3	2	0.9	6	20 MW	12%	99	1,376	72	0.3	5	84	1023	54	0.5	5	47	815	43	0.2	3	131	1,838	97	0.7	8
1:23	150 MW	88%	12	3	2	0.9	6	20 MW	12%	99	1,376	72	0.3	5	83	1017	54	0.5	5	49	829	44	0.2	3	132	1,846	97	0.7	9
1:24	155 MW	91%	12	3	1	1.0	6	20 MW	12%	99	1,376	72	0.3	5	83	962	53	0.5	5	50	843	44	0.2	3	133	1,804	97	0.7	9
1:25	160 MW	94%	12	3	1	1.0	6	20 MW	12%	99	1,376	72	0.3	5	82	913	52	0.5	5	51	856	45	0.2	3	134	1,768	97	0.7	9
1:26	165 MW	97%	12	3	1	1.0	6	20 MW	12%	99	1,376	72	0.3	5	81	873	51	0.5	5	52	868	46	0.2	3	134	1,742	97	0.7	9
1:27	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	80	843	50	0.5	5	53	880	46	0.2	4	134	1,723	97	0.7	9
1:28	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	79	821	49	0.5	5	54	891	47	0.2	4	133	1,712	96	0.8	9
1:29	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	77	798	48	0.5	5	55	902	47	0.2	4	133	1,700	95	0.8	9
1:30	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	76	775	47	0.5	5	56	912	48	0.2	4	132	1,687	95	0.8	9
1:31	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	74	752	46	0.6	5	57	922	49	0.2	4	132	1,674	94	0.8	9
1:32	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	73	729	44	0.6	5	58	932	49	0.2	4	131	1,661	93	0.8	9
1:33	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	72	706	43	0.6	5	59	941	49	0.2	4	131	1,647	93	0.8	9
1:34	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	70	683	42	0.6	5	60	949	50	0.2	4	130	1,633	92	0.8	9
1:35	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	69	660	41	0.6	5	61	958	50	0.2	4	129	1,618	91	0.9	9
1:36	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	67	638	40	0.6	5	61	966	51	0.2	4	129	1,603	90	0.9	9
1:37	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	66	615	38	0.6	5	62	973	51	0.2	4	128	1,588	90	0.9	9
1:38	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	65	592	37	0.6	5	63	981	52	0.2	4	127	1,573	89	0.9	9
1:39	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	63	569	36	0.7	5	63	988	52	0.2	4	126	1,557	88	0.9	9
1:40	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	62	546	35	0.7	5	64	995	52	0.3	4	126	1,541	87	0.9	9
1:41	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	60	523	34	0.7	5	65	1002	53	0.3	4	125	1,525	86	0.9	9
1:42	170 MW	100%	14	3	1	1.1	6	20 MW	12%	99	1,376	72	0.3	5	59	500	33	0.7	5	65	1008	53	0.3	4	124	1,509	86	0.9	9
1:43	170 MW	100%	14	3	1	1.1	6	25 MW	15%	103	1,236	84	0.4	5	57	478	31	0.7	5	66	1012	54	0.3	4	123	1,489	85	1.0	9
1:44	170 MW	100%	14	3	1	1.1	6	30 MW	18%	108	1,096	96	0.4	5	56	455	30	0.7	5	67	1013	54	0.3	4	123	1,468	84	1.0	9
1:45	170 MW	100%	14	3	1	1.1	6	35 MW	21%	112	956	109	0.4	5	55	432	29	0.7	5	68	1,029	56	0.3	4	123	1,461	85	1.0	9
1:46	170 MW	100%	14	3	1	1.1	6	40 MW	24%	120	969	96	0.4	5	53	409	28	0.7	5	70	1,045	58	0.3	4	124	1,454	85	1.0	10
1:47	170 MW	100%	14	3	1	1.1	6	45 MW	26%	127	982	83	0.5	5	52	386	27	0.8	5	72	1,062	59	0.3	4	124	1,448	86	1.0	10
1:48	170 MW	100%	14	3	1	1.1	6	50 MW	29%	134	996	71	0.5	5	50	363	25	0.8	5	75	1,078	60	0.3	4	125	1,442	86	1.1	10
1:49	170 MW	100%	14	3	1	1.1	6	55 MW	32%	142	877	60	0.5	5	49	340	24	0.8	5	77	1,093	61	0.3	4	126	1,433	85	1.1	10
1:50	170 MW	100%	14	3	1	1.1	6	60 MW	35%	150	692	50	0.5	5	48	317	23	0.8	5	80	1,105	62	0.3	4	127	1,422	85	1.1	10
1:51	170 MW	100%	14	3	1	1.1	6	65 MW	38%	157	508	40	0.6	5	46	295	22	0.8	5	82	1,113	63	0.3	5	128	1,408	85	1.1	10
1:52	170 MW	100%	14	3	1	1.1	6	70 MW	41%	152	354	33	0.6	5	45	272	21	0.8	6	84	1,112	63	0.3	5	129	1,384	83	1.1	10
1:53	170 MW	100%	14	3	1	1.1	6	75 MW	44%	122	261	28	0.6	5	43	249	20	0.8	6	86	1,110	62	0.3	5	129	1,359	82	1.2	10
1:54	170 MW	100%	14	3	1	1.1	6	80 MW	47%	92	168	24	0.6	5	42	226	18	0.8	6	87	1,106	62	0.3	5	128	1,332	80	1.2	10
1:55	170 MW	100%	14	3	1	1.1	6	85 MW	50%	62	76	20	0.7	5	40	203	17	0.9	6	87	1,101	62	0.3	5	128	1,304	79	1.2	10
1:56	170 MW	100%	14	3	1	1.1	6	90 MW	53%	52	62	17	0.7	5	39	180	16	0.9	6	87	1,095	61	0.3	5	126	1,275	77	1.2	10
1:57	170 MW	100%	14	3	1	1.1	6	95 MW	56%	36	41	12	0.7	5	38	157	15	0.9	6	87	1,089	61	0.4	5	125	1,246	76	1.2	10
1:58	170 MW	100%	14	3	1	1.1	6	100 MW	59%	20	20	6	0.7	6	36	137	13	0.9	6	87	1,083	60	0.4	5	123	1,219	74	1.3	10
1:59	170 MW	100%	14	3	1	1.1	6	105 MW	62%	9	5	3	0.8	6	34	119	12	0.9	6	87	1,076	60	0.4	5	121	1,195	71	1.3	10
2:00	170 MW	100%	14	3	1	1.1	6	110 MW	65%	10	4	3	0.8	6	33	103	10	0.9	6	86	1,070	59	0.4	5	119	1,172	69	1.3	10
2:01	170 MW	100%	14	3	1	1.1	6	115 MW	68%	10	3	3	0.8	6	31	87	8	0.9	6	86	1,063	58	0.4	5	117	1,150	67	1.3	10
2:02	170 MW	100%	14	3	1	1.1	6	119 MW	70%	10	3	3	0.8	6	29	70	7	0.9	6	86	1,056	58	0.4	5	115	1,127	65	1.3	11
2:03	170 MW	100%	14	3	1	1.1	6	123 MW	72%	10	3	3	0.8	6	27	54	6	0.9	6	85	1,050	57	0.4	5	112	1,103	63	1.4	11
2:04	170 MW	100%	14	3	1	1.1	6	127 MW	75%	10	3	3	0.8	6	25	39	5	1.0	6	85	1,043	56	0.4	5	110	1,082	61	1.4	11
2:05	170 MW	100%	14	3	1	1.1	6	131 MW	77%	10	3	3	0.8	6	23	28	4	1.0	6	85	1,036	56	0.4	5	107	1,064	60	1.4	11
2:06	170 MW	100%	14	3	1	1.1	6	135 MW	79%	10	3	3	0.8	6	20	19	3	1.0	6	84	1,030	55	0.4	5	105	1,049	59	1.4	11
2:07	170 MW	100%	14	3	1	1.1	6	139 MW	82%	12	3	2	0.9	6	18	13	3	1.0	6	84	1,023	54	0.4	5	102	1,037	57	1.4	11
2:08	170 MW	100%	14	3	1	1.1	6	143 MW	84%	12	3	2	0.9	6	16	9	3	1.0	6	83	1,017	54	0.5	5	100	1,026	56	1.4	11
2:09	170 MW	100%	14	3	1	1.1	6	147 MW	86%	12	3	2	0.9	6	15	6	2	1.0	6	83	962	53	0.5	5	98	968	55	1.5	11

WARM START

Time	LEAD CTG - INSTANTANEOUS							LAG CTG - INSTANTANEOUS						
	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	CT Load		NO_X	CO	VOC	SO_2	PM_{10}
			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
2:10	170 MW	100%	14	3	1	1.1	6	151 MW	89%	12	3	2	0.9	6
2:11	170 MW	100%	14	3	1	1.1	6	155 MW	91%	12	3	1	1.0	6
2:12	170 MW	100%	14	3	1	1.1	6	159 MW	94%	12	3	1	1.0	6
2:13	170 MW	100%	14	3	1	1.1	6	163 MW	96%	12	3	1	1.0	6
2:14	170 MW	100%	14	3	1	1.1	6	167 MW	98%	12	3	1	1.0	6
2:15	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:16	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:17	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:18	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:19	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:20	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:21	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:22	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:23	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:24	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:25	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:26	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:27	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:28	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:29	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:30	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:31	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:32	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:33	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:34	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:35	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:36	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:37	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:38	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:39	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:40	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:41	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:42	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:43	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:44	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:45	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:46	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:47	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:48	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:49	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:50	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:51	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:52	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:53	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:54	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:55	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:56	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:57	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:58	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
2:59	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:00	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:01	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:02	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:03	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:04	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:05	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:06	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:07	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:08	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:09	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:10	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:11	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:12	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:13	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
3:14	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6

Time	LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
2:10	14	5	2	1.0	6	82	913	52	0.5	5	96	918	54	1.5	11
2:11	13	4	2	1.0	6	81	873	51	0.5	5	95	878	53	1.5	11
2:12	13	4	1	1.0	6	80	843	50	0.5	5	93	847	52	1.5	11
2:13	13	3	1	1.0	6	79	821	49	0.5	5	92	824	50	1.5	11
2:14	13	3	1	1.0	6	77	798	48	0.5	5	90	801	49	1.6	11
2:15	13	3	1	1.0	6	76	775	47	0.5	5	89	778	48	1.6	11
2:16	13	3	1	1.0	6	74	752	46	0.6	5	88	755	47	1.6	11
2:17	13	3	1	1.0	6	73	729	44	0.6	5	86	732	46	1.6	11
2:18	13	3	1	1.0	6	72	706	43	0.6	5	85	709	44	1.6	11
2:19	13	3	1	1.0	6	70	683	42	0.6	5	84	687	43	1.6	11
2:20	13	3	1	1.1	6	69	660	41	0.6	5	82	664	42	1.7	11
2:21	13	3	1	1.1	6	67	638	40	0.6	5	81	641	41	1.7	11
2:22	14	3	1	1.1	6	66	615	39	0.6	5	79	618	40	1.7	11
2:23	14	3	1	1.1	6	64	592	37	0.6	5	78	595	38	1.7	11
2:24	14	3	1	1.1	6	63	569	36	0.7	5	77	572	37	1.7	11
2:25	14	3	1	1.1	6	62	546	35	0.7	5	75	549	36	1.7	11
2:26	14	3	1	1.1	6	60	523	34	0.7	5	74	527	35	1.7	11
2:27	14	3	1	1.1	6	59	500	33	0.7	5	72	504	34	1.8	11
2:28	14	3	1	1.1	6	57	477	31	0.7	5	71	481	32	1.8	11
2:29	14	3	1	1.1	6	56	455	30	0.7	5	70	458	31	1.8	11
2:30	14	3	1	1.1	6	54	432	29	0.7	5	68	435	30	1.8	11
2:31	14	3	1	1.1	6	53	409	28	0.7	5	67	412	29	1.8	11
2:32	14	3	1	1.1	6	52	386	27	0.7	5	65	389	28	1.8	11
2:33	14	3	1	1.1	6	50	363	26	0.8	5	64	366	27	1.8	11
2:34	14	3	1	1.1	6	49	340	24	0.8	5	62	344	25	1.8	11
2:35	14	3	1	1.1	6	47	317	23	0.8	5	61	321	24	1.8	11
2:36	14	3	1	1.1	6	46	294	22	0.8	5	60	298	23	1.9	11
2:37	14	3	1	1.1	6	45	272	21	0.8	6	58	275	22	1.9	11
2:38	14	3	1	1.1	6	43	249	20	0.8	6	57	252	21	1.9	11
2:39	14	3	1	1.1	6	42	226	18	0.8	6	55	229	19	1.9	11
2:40	14	3	1	1.1	6	40	203	17	0.8	6	54	206	18	1.9	11
2:41	14	3	1	1.1	6	39	180	16	0.9	6	52	183	17	1.9	11
2:42	14	3	1	1.1	6	37	157	15	0.9	6	51	161	16	1.9	11
2:43	14	3	1	1.1	6	36	137	13	0.9	6	50	140	14	1.9	11
2:44	14	3	1	1.1	6	34	118	12	0.9	6	48	122	13	2.0	11
2:45	14	3	1	1.1	6	33	103	10	0.9	6	46	106	11	2.0	11
2:46	14	3	1	1.1	6	31	87	9	0.9	6	45	90	10	2.0	11
2:47	14	3	1	1.1	6	29	70	7	0.9	6	43	74	8	2.0	11
2:48	14	3	1	1.1	6	27	54	6	0.9	6	41	57	7	2.0	11
2:49	14	3	1	1.1	6	25	39	5	0.9	6	39	42	6	2.0	11
2:50	14	3	1	1.1	6	23	28	4	1.0	6	36	31	5	2.0	11
2:51	14	3	1	1.1	6	20	19	4	1.0	6	34	23	5	2.0	11
2:52	14	3	1	1.1	6	18	13	3	1.0	6	32	17	4	2.0	11
2:53	14	3	1	1.1	6	16	9	3	1.0	6	30	12	4	2.0	11
2:54	14	3	1	1.1	6	15	6	2	1.0	6	28	10	3	2.1	11
2:55	14	3	1	1.1	6	14	5	2	1.0	6	28	8	3	2.1	11
2:56	14	3	1	1.1	6	13	4	2	1.0	6	27	7	3	2.1	11
2:57	14	3	1	1.1	6	13	4	1	1.0	6	27	7	2	2.1	11
2:58	14	3	1	1.1	6	13	3	1	1.0	6	27	7	2	2.1	12
2:59	14	3	1	1.1	6	13	3	1	1.0	6	27	7	2	2.1	12
3:00	14	3	1	1.1	6	13	3	1	1.0	6	27	7	2	2.1	12
3:01	14	3	1	1.1	6	13	3	1	1.0	6	27	7	2	2.1	12
3:02	14	3	1	1.1	6	13	3	1	1.0	6	27	7	2	2.1	12
3:03	14	3	1	1.1	6	13	3	1	1.0	6	27	7	2	2.1	12
3:04	14	3	1	1.1	6	13	3	1	1.0	6	27	7	2	2.1	12
3:05	14	3	1	1.1	6	13	3	1	1.0	6	27	7	2	2.1	12
3:06	14	3	1	1.1	6	13	3	1	1.0	6	27	7	2	2.1	12
3:07	14	3	1	1.1	6	13	3	1	1.0	6	27	7	2	2.1	12
3:08	14	3	1	1.1	6	13	3	1	1.1	6	27	7	2	2.1	12
3:09	14	3	1	1.1	6	13	3	1	1.1	6	27	7	2	2.1	12
3:10	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:11	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:12	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:13	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:14	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12

WARM START

Time	LEAD CTG - INSTANTANEOUS							LAG CTG - INSTANTANEOUS							LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
3:15	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:16	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:17	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:18	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:19	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:20	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:21	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:22	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:23	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:24	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:25	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:26	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:27	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:28	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:29	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12
3:30	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6	14	3	1	1.1	6	14	3	1	1.1	6	27	7	2	2.1	12

		NO_X	CO	VOC	SO_2	PM_{10}		NO_X	CO	VOC	SO_2	PM_{10}		NO_X	CO	VOC	SO_2	PM_{10}
LEAD	lb	101	1,132	66	1	10	**LAG**	91	1,130	65	0	5	**MAX**	134	1,846	97	2.1	12
TOTAL	lb	192	2,261	131	2	15												
	ton	0.1	1.1	0.1	0.0	0.0												

Notes
1) Emissions during 120 minute warm start-up highlighted in gray
2) Warm-start duration defined as the time needed for both CTGs to ramp to a load > 60%
3) Emissions during normal operation (> 60% CTG load) shown for purposes of evaluating worst case 1-hr emission rates

HOT

Time	LEAD CTG - INSTANTANEOUS							LAG CTG - INSTANTANEOUS							LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
0:00	Purge	0%	0	0	0	0	0	Purge	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0:01	Purge	0%	0	0	0	0	0	Purge	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0:02	Purge	0%	0	0	0	0	0	Purge	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0:03	Purge	0%	0	0	0	0	0	Purge	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0:04	Purge	0%	0	0	0	0	0	Purge	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0:05	Purge	0%	0	0	0	0	0	Purge	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0:06	Purge	0%	0	0	0	0	0	Purge	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
0:07	Light Off	0%	33	400	42	0.2	3	Light Off	0%	33	400	42	0.2	3	4	50	5	0	0	4	50	5	0	0	8	100	10	0.1	1
0:08	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	7	89	9	0	1	7	89	9	0	1	15	178	19	0.1	1
0:09	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	10	120	13	0	1	10	120	13	0	1	20	240	25	0.1	2
0:10	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	12	145	15	0	1	12	145	15	0	1	24	291	30	0.2	2
0:11	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	14	167	17	0	1	14	167	17	0	1	28	333	35	0.2	3
0:12	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	15	185	19	0	2	15	185	19	0	2	31	369	38	0.2	3
0:13	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	17	200	21	0	2	17	200	21	0	2	33	400	42	0.2	3
0:14	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	18	213	22	0	2	18	213	22	0	2	36	427	44	0.2	4
0:15	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	19	225	23	0	2	19	225	23	0	2	38	450	47	0.3	4
0:16	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	20	235	25	0	2	20	235	25	0	2	39	471	49	0.3	4
0:17	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	20	244	25	0	2	20	244	25	0	2	41	489	51	0.3	4
0:18	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	21	253	26	0	2	21	253	26	0	2	42	505	53	0.3	4
0:19	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	22	260	27	0	2	22	260	27	0	2	43	520	54	0.3	4
0:20	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	22	267	28	0	2	22	267	28	0	2	44	533	56	0.3	4
0:21	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	23	273	28	0	2	23	273	28	0	2	45	545	57	0.3	5
0:22	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	23	278	29	0	2	23	278	29	0	2	46	557	58	0.3	5
0:23	ramp to FSNL	0%	33	400	42	0.2	3	ramp to FSNL	0%	33	400	42	0.2	3	24	283	30	0	2	24	283	30	0	2	47	567	59	0.3	5
0:24	FSNL	0%	41	3,307	41	0.2	5	FSNL	0%	41	3,307	41	0.2	5	24	404	30	0	2	24	404	30	0	2	49	809	60	0.3	5
0:25	7 MW	4%	63	2,553	52	0.3	5	7 MW	4%	63	2,553	52	0.3	5	26	487	31	0	3	26	487	31	0	3	52	974	62	0.3	5
0:26	14 MW	8%	86	1,799	63	0.3	5	14 MW	8%	86	1,799	63	0.3	5	28	536	32	0	3	28	536	32	0	3	56	1,071	64	0.3	5
0:27	21 MW	12%	100	1,329	76	0.3	5	21 MW	12%	100	1,329	76	0.3	5	31	564	34	0	3	31	564	34	0	3	61	1,128	67	0.4	5
0:28	28 MW	16%	106	1,143	92	0.4	5	28 MW	16%	106	1,143	92	0.4	5	33	584	36	0	3	33	584	36	0	3	66	1,168	71	0.4	6
0:29	35 MW	21%	112	956	109	0.4	5	35 MW	21%	112	956	109	0.4	5	36	596	38	0	3	36	596	38	0	3	72	1,192	76	0.4	6
0:30	42 MW	25%	112	956	109	0.4	5	42 MW	25%	112	956	109	0.4	5	38	608	40	0	3	38	608	40	0	3	77	1,216	81	0.4	6
0:31	49 MW	29%	132	991	75	0.5	5	49 MW	29%	132	991	75	0.5	5	41	620	41	0	3	41	620	41	0	3	82	1,240	83	0.4	6
0:32	56 MW	33%	142	877	60	0.5	5	56 MW	33%	142	877	60	0.5	5	44	628	42	0	3	44	628	42	0	3	89	1,255	84	0.4	6
0:33	63 MW	37%	155	569	44	0.5	5	63 MW	37%	155	569	44	0.5	5	48	626	42	0	3	48	626	42	0	3	95	1,252	84	0.5	6
0:34	70 MW	41%	152	354	33	0.6	5	70 MW	41%	152	354	33	0.6	5	51	618	42	0	3	51	618	42	0	3	101	1,236	83	0.5	6
0:35	77 MW	45%	112	230	27	0.6	5	77 MW	45%	112	230	27	0.6	5	52	607	41	0	3	52	607	41	0	3	105	1,215	83	0.5	6
0:36	84 MW	49%	72	107	22	0.6	5	84 MW	49%	72	107	22	0.6	5	53	594	41	0	3	53	594	41	0	3	106	1,188	82	0.5	7
0:37	91 MW	54%	46	55	15	0.7	5	91 MW	54%	46	55	15	0.7	5	53	580	40	0	3	53	580	40	0	3	105	1,159	80	0.5	7
0:38	98 MW	58%	25	27	8	0.7	5.5	98 MW	58%	25	27	8	0.7	5.5	52	565	39	0	3	52	565	39	0	3	104	1,131	79	0.6	7
0:39	105 MW	62%	9	5	3	0.8	5.8	105 MW	62%	9	5	3	0.8	5.8	51	551	38	0	3	51	551	38	0	3	102	1,103	77	0.6	7
0:40	112 MW	66%	10	4	3	0.8	5.8	112 MW	66%	10	4	3	0.8	5.8	50	538	38	0	4	50	538	38	0	4	100	1,076	75	0.6	7
0:41	119 MW	70%	10	3	3	0.8	5.8	119 MW	70%	10	3	3	0.8	5.8	49	525	37	0	4	49	525	37	0	4	98	1,051	73	0.6	7
0:42	126 MW	74%	10	3	3	0.8	5.8	126 MW	74%	10	3	3	0.8	5.8	48	513	36	0	4	48	513	36	0	4	96	1,026	72	0.7	7
0:43	133 MW	78%	10	3	3	0.8	5.8	133 MW	78%	10	3	3	0.8	5.8	47	502	35	0	4	47	502	35	0	4	94	1,003	70	0.7	7
0:44	140 MW	82%	12	3	2	0.9	5.8	140 MW	82%	12	3	2	0.9	5.8	46	490	34	0	4	46	490	34	0	4	93	981	69	0.7	7
0:45	147 MW	86%	12	3	2	0.9	5.8	147 MW	86%	12	3	2	0.9	5.8	46	480	34	0	4	46	480	34	0	4	91	960	67	0.7	8
0:46	154 MW	91%	12	3	1	1.0	5.8	154 MW	91%	12	3	1	1.0	5.8	45	470	33	0	4	45	470	33	0	4	90	939	66	0.8	8
0:47	161 MW	95%	12	3	1	1.0	5.8	161 MW	95%	12	3	1	1.0	5.8	44	460	32	0	4	44	460	32	0	4	88	920	65	0.8	8
0:48	168 MW	99%	12	3	1	1.0	5.8	168 MW	99%	12	3	1	1.0	5.8	44	451	32	0	4	44	451	32	0	4	87	901	63	0.8	8
0:49	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	43	442	31	0	4	43	442	31	0	4	86	883	62	0.8	8
0:50	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	42	433	31	0	4	42	433	31	0	4	85	866	61	0.9	8
0:51	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	42	425	30	0	4	42	425	30	0	4	84	850	60	0.9	8
0:52	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	41	417	29	0	4	41	417	29	0	4	83	834	59	0.9	8
0:53	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	41	409	29	0	4	41	409	29	0	4	82	819	58	0.9	8
0:54	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	40	402	28	0	4	40	402	28	0	4	81	804	57	0.9	8
0:55	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	40	395	28	0	4	40	395	28	0	4	80	790	56	1.0	8
0:56	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	39	388	27	0	4	39	388	27	0	4	79	776	55	1.0	8
0:57	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	39	381	27	1	4	39	381	27	1	4	78	763	54	1.0	8
0:58	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	39	375	27	1	4	39	375	27	1	4	77	750	53	1.0	8
0:59	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	38	369	26	1	4	38	369	26	1	4	76	737	52	1.0	8
1:00	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	38	369	26	1	4	38	369	26	1	4	77	737	52	1.1	9
1:01	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	39	369	26	1	4	39	369	26	1	4	77	738	52	1.1	9
1:02	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	39	369	26	1	5	39	369	26	1	5	78	738	52	1.2	9
1:03	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	39	369	26	1	5	39	369	26	1	5	78	738	52	1.2	9
1:04	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	39	369	26	1	5	39	369	26	1	5	78	738	52	1.2	9

HOT

Time	LEAD CTG - INSTANTANEOUS							LAG CTG - INSTANTANEOUS							LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
1:05	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	39	369	26	1	5	39	369	26	1	5	79	738	52	1.3	10
1:06	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	40	369	26	1	5	40	369	26	1	5	79	738	52	1.3	10
1:07	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	39	362	26	1	5	39	362	26	1	5	79	725	51	1.3	10
1:08	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	39	356	25	1	5	39	356	25	1	5	78	712	50	1.3	10
1:09	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	39	349	24	1	5	39	349	24	1	5	77	698	48	1.4	10
1:10	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	38	343	23	1	5	38	343	23	1	5	77	685	47	1.4	10
1:11	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	38	336	23	1	5	38	336	23	1	5	76	672	46	1.4	10
1:12	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	38	329	22	1	5	38	329	22	1	5	75	659	44	1.5	10
1:13	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	37	323	21	1	5	37	323	21	1	5	75	646	43	1.5	10
1:14	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	37	316	21	1	5	37	316	21	1	5	74	632	42	1.5	10
1:15	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	37	310	20	1	5	37	310	20	1	5	73	619	40	1.5	11
1:16	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	36	303	19	1	5	36	303	19	1	5	73	606	39	1.6	11
1:17	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	36	296	19	1	5	36	296	19	1	5	72	593	37	1.6	11
1:18	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	36	290	18	1	5	36	290	18	1	5	71	579	36	1.6	11
1:19	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	35	283	17	1	5	35	283	17	1	5	71	566	35	1.7	11
1:20	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	35	276	17	1	5	35	276	17	1	5	70	553	33	1.7	11
1:21	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	35	270	16	1	5	35	270	16	1	5	69	540	32	1.7	11
1:22	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	34	263	15	1	6	34	263	15	1	6	69	527	31	1.7	11
1:23	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	34	257	15	1	6	34	257	15	1	6	68	513	29	1.8	11
1:24	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	34	202	14	1	6	34	202	14	1	6	67	403	28	1.8	11
1:25	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	33	159	13	1	6	33	159	13	1	6	66	318	26	1.8	11
1:26	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	32	129	12	1	6	32	129	12	1	6	63	258	24	1.8	11
1:27	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	30	107	11	1	6	30	107	11	1	6	60	214	22	1.9	11
1:28	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	29	88	9	1	6	29	88	9	1	6	57	176	19	1.9	11
1:29	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	27	72	8	1	6	27	72	8	1	6	54	144	15	1.9	11
1:30	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	25	56	6	1	6	25	56	6	1	6	51	113	12	1.9	11
1:31	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	23	40	5	1	6	23	40	5	1	6	47	80	9	2.0	11
1:32	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	21	25	4	1	6	21	25	4	1	6	42	51	7	2.0	11
1:33	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	19	16	3	1	6	19	16	3	1	6	38	32	6	2.0	11
1:34	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	17	10	2	1	6	17	10	2	1	6	33	20	5	2.0	11
1:35	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	15	6	2	1	6	15	6	2	1	6	30	13	4	2.0	11
1:36	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	5	2	1	6	14	5	2	1	6	28	9	3	2.0	11
1:37	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	13	4	1	1	6	13	4	1	1	6	27	7	3	2.1	11
1:38	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	13	3	1	1	6	13	3	1	1	6	26	7	2	2.1	12
1:39	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	13	3	1	1	6	13	3	1	1	6	26	7	2	2.1	12
1:40	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	13	3	1	1	6	13	3	1	1	6	27	6	2	2.1	12
1:41	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	13	3	1	1	6	13	3	1	1	6	27	7	2	2.1	12
1:42	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	13	3	1	1	6	13	3	1	1	6	27	7	2	2.1	12
1:43	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	13	3	1	1	6	13	3	1	1	6	27	7	2	2.1	12
1:44	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:45	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:46	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:47	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:48	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:49	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:50	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:51	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:52	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:53	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:54	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:55	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:56	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:57	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:58	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:59	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:00	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:01	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:02	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:03	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:04	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:05	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:06	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:07	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:08	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:09	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12

HOT

Time	LEAD CTG - INSTANTANEOUS							LAG CTG - INSTANTANEOUS							LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
2:10	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:11	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:12	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:13	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:14	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:15	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:16	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:17	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:18	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:19	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:20	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:21	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:22	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:23	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:24	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:25	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:26	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:27	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:28	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:29	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:30	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:31	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:32	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:33	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:34	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:35	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:36	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:37	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:38	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:39	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:40	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:41	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:42	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:43	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:44	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:45	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:46	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:47	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:48	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:49	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:50	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:51	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:52	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:53	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:54	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:55	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:56	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:57	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:58	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
2:59	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:00	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:01	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:02	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:03	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:04	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:05	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:06	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:07	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:08	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:09	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:10	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:11	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:12	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:13	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:14	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12

HOT

Time	LEAD CTG - INSTANTANEOUS CT Load		NO_X lb/hr	CO lb/hr	VOC lb/hr	SO_2 lb/hr	PM_{10} lb/hr	LAG CTG - INSTANTANEOUS CT Load		NO_X lb/hr	CO lb/hr	VOC lb/hr	SO_2 lb/hr	PM_{10} lb/hr	LEAD CTG 1-HR AVERAGE NO_X lb/hr	CO lb/hr	VOC lb/hr	SO_2 lb/hr	PM_{10} lb/hr	LAG CTG 1-HR AVERAGE NO_X lb/hr	CO lb/hr	VOC lb/hr	SO_2 lb/hr	PM_{10} lb/hr	2 CTGs - 1 HR AVERAGE NO_X lb/hr	CO lb/hr	VOC lb/hr	SO_2 lb/hr	PM_{10} lb/hr
3:15	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:16	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:17	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:18	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:19	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:20	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:21	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:22	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:23	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:24	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:25	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:26	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:27	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:28	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:29	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
3:30	170 MW	100%	14	3	1	1.1	5.8	170 MW	100%	14	3	1	1.1	5.8	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12

		NO_X	CO	VOC	SO_2	PM_{10}			NO_X	CO	VOC	SO_2	PM_{10}			NO_X	CO	VOC	SO_2	PM_{10}
LEAD	lb	34	368	26	0.2	2.3	**LAG**		34	368	26	0.2	2.3		**MAX**	79	738	52	2.1	12
TOTAL	lb	68	735	51	0	5														
	ton	0.0	0.4	0.0	0.0	0.0														

Notes
1) Emissions during 40-minute hot start-up highlighted in gray
2) Emissions during normal operation (> 60% CTG load) shown for purposes of evaluating worst case 1-hr emission rates

SHUTDOWN

Time	LEAD CTG - INSTANTANEOUS							LAG CTG - INSTANTANEOUS						
	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	CT Load		NO_X	CO	VOC	SO_2	PM_{10}
			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
0:00	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:01	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:02	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:03	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:04	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:05	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:06	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:07	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:08	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:09	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:10	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:11	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:12	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:13	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:14	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:15	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:16	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:17	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:18	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:19	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:20	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:21	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:22	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:23	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:24	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:25	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:26	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:27	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:28	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:29	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:30	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:31	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:32	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:33	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:34	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:35	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:36	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:37	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:38	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:39	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:40	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:41	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:42	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:43	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:44	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:45	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:46	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:47	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:48	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:49	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:50	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:51	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:52	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:53	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:54	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:55	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:56	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:57	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:58	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
0:59	170 MW	100%	14	3	1	1.1	6	170 MW	100%	14	3	1	1.1	6
1:00	162 MW	95%	12	3	1	1.0	6	162 MW	95%	12	3	1	1.0	6
1:01	153 MW	90%	12	3	1	1.0	6	153 MW	90%	12	3	1	1.0	6
1:02	145 MW	85%	12	3	2	0.9	6	145 MW	85%	12	3	2	0.9	6
1:03	136 MW	80%	12	3	2	0.9	6	136 MW	80%	12	3	2	0.9	6
1:04	128 MW	75%	10	3	3	0.8	6	128 MW	75%	10	3	3	0.8	6
1:05	119 MW	70%	10	3	3	0.8	6	119 MW	70%	10	3	3	0.8	6
1:06	111 MW	65%	10	4	3	0.8	6	111 MW	65%	10	4	3	0.8	6

Time	LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
0:00	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:01	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:02	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:03	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:04	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:05	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:06	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:07	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:08	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:09	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:10	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:11	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:12	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:13	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:14	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:15	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:16	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:17	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:18	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:19	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:20	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:21	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:22	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:23	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:24	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:25	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:26	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:27	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:28	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:29	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:30	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:31	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:32	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:33	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:34	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:35	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:36	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:37	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:38	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:39	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:40	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:41	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:42	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:43	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:44	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:45	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:46	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:47	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:48	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:49	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:50	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:51	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:52	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:53	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:54	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:55	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:56	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:57	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:58	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
0:59	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:00	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:01	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:02	14	3	1	1	6	14	3	1	1	6	27	7	2	2.1	12
1:03	13	3	1	1	6	13	3	1	1	6	27	7	2	2.1	12
1:04	13	3	1	1	6	13	3	1	1	6	27	7	2	2.1	12
1:05	13	3	1	1	6	13	3	1	1	6	27	7	2	2.1	12
1:06	13	3	1	1	6	13	3	1	1	6	27	7	2	2.1	12

SHUTDOWN

Time	LEAD CTG - INSTANTANEOUS							LAG CTG - INSTANTANEOUS							LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	CT Load		NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr			lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
1:07	102 MW	60%	9	6	3	0.8	6	102 MW	60%	9	6	3	0.8	6	13	3	1	1	6	13	3	1	1	6	26	7	2	2.1	12
1:08	94 MW	55%	36	41	12	0.7	5	94 MW	55%	36	41	12	0.7	5	14	4	1	1	6	14	4	1	1	6	27	8	3	2.1	11
1:09	85 MW	50%	62	76	20	0.7	5	85 MW	50%	62	76	20	0.7	5	14	5	2	1	6	14	5	2	1	6	29	10	3	2.0	11
1:10	77 MW	45%	112	230	27	0.6	5	77 MW	45%	112	230	27	0.6	5	16	9	2	1	6	16	9	2	1	6	32	18	4	2.0	11
1:11	68 MW	40%	162	384	34	0.6	5	68 MW	40%	162	384	34	0.6	5	19	15	3	1	6	19	15	3	1	6	37	31	5	2.0	11
1:12	60 MW	35%	150	692	50	0.5	5	60 MW	35%	150	692	50	0.5	5	21	27	3	1	6	21	27	3	1	6	42	54	7	2.0	11
1:13	51 MW	30%	137	1,000	66	0.5	5	51 MW	30%	137	1,000	66	0.5	5	23	43	5	1	6	23	43	5	1	6	46	87	9	2.0	11
1:14	43 MW	25%	112	956	109	0.4	5	43 MW	25%	112	956	109	0.4	5	25	59	6	1	6	25	59	6	1	6	49	119	13	2.0	11
1:15	34 MW	20%	112	956	109	0.4	5	34 MW	20%	112	956	109	0.4	5	26	75	8	1	6	26	75	8	1	6	52	150	16	1.9	11
1:16	26 MW	15%	105	1,189	88	0.4	5	26 MW	15%	105	1,189	88	0.4	5	28	95	10	1	6	28	95	10	1	6	55	190	19	1.9	11
1:17	17 MW	10%	97	1,422	68	0.3	5	17 MW	10%	97	1,422	68	0.3	5	29	119	11	1	6	29	119	11	1	6	58	237	21	1.9	11
1:18	9 MW	5%	69	2,365	55	0.3	5	9 MW	5%	69	2,365	55	0.3	5	30	158	12	1	6	30	158	12	1	6	60	316	23	1.9	11
1:19	0 MW	0%	41	3,307	41	0.2	5	0 MW	0%	41	3,307	41	0.2	5	30	213	12	1	6	30	213	12	1	6	61	426	25	1.8	11
1:20	0 MW	0%	41	3,307	41	0.2	5	0 MW	0%	41	3,307	41	0.2	5	31	268	13	1	6	31	268	13	1	6	62	536	26	1.8	11
1:21	0 MW	0%	41	3,307	41	0.2	5	0 MW	0%	41	3,307	41	0.2	5	31	323	14	1	6	31	323	14	1	6	63	646	27	1.8	11
1:22	0 MW	0%	41	3,307	41	0.2	5	0 MW	0%	41	3,307	41	0.2	5	32	378	14	1	6	32	378	14	1	6	64	756	29	1.7	11
1:23	0 MW	0%	41	3,307	41	0.2	5	0 MW	0%	41	3,307	41	0.2	5	32	433	15	1	6	32	433	15	1	6	65	866	30	1.7	11
1:24			0	0	0	0.0	0			0	0	0	0.0	0	32	433	15	1	5	32	433	15	1	5	64	866	30	1.7	11
1:25			0	0	0	0.0	0			0	0	0	0.0	0	32	433	15	1	5	32	433	15	1	5	64	866	30	1.7	11
1:26			0	0	0	0.0	0			0	0	0	0.0	0	32	433	15	1	5	32	433	15	1	5	63	866	30	1.6	11
1:27			0	0	0	0.0	0			0	0	0	0.0	0	31	433	15	1	5	31	433	15	1	5	63	866	30	1.6	10
1:28			0	0	0	0.0	0			0	0	0	0.0	0	31	433	15	1	5	31	433	15	1	5	62	866	30	1.5	10
1:29			0	0	0	0.0	0			0	0	0	0.0	0	31	433	15	1	5	31	433	15	1	5	62	866	30	1.5	10
1:30			0	0	0	0.0	0			0	0	0	0.0	0	31	433	15	1	5	31	433	15	1	5	61	866	30	1.5	10
1:31			0	0	0	0.0	0			0	0	0	0.0	0	30	433	15	1	5	30	433	15	1	5	61	865	30	1.4	10
1:32			0	0	0	0.0	0			0	0	0	0.0	0	30	433	15	1	5	30	433	15	1	5	60	865	30	1.4	9
1:33			0	0	0	0.0	0			0	0	0	0.0	0	30	433	15	1	5	30	433	15	1	5	60	865	30	1.4	9
1:34			0	0	0	0.0	0			0	0	0	0.0	0	30	433	15	1	5	30	433	15	1	5	60	865	30	1.3	9
1:35			0	0	0	0.0	0			0	0	0	0.0	0	30	433	15	1	4	30	433	15	1	4	59	865	30	1.3	9
1:36			0	0	0	0.0	0			0	0	0	0.0	0	29	432	15	1	4	29	432	15	1	4	59	865	29	1.3	9
1:37			0	0	0	0.0	0			0	0	0	0.0	0	29	432	15	1	4	29	432	15	1	4	58	865	29	1.2	8
1:38			0	0	0	0.0	0			0	0	0	0.0	0	29	432	15	1	4	29	432	15	1	4	58	865	29	1.2	8
1:39			0	0	0	0.0	0			0	0	0	0.0	0	29	432	15	1	4	29	432	15	1	4	57	865	29	1.2	8
1:40			0	0	0	0.0	0			0	0	0	0.0	0	28	432	15	1	4	28	432	15	1	4	57	864	29	1.1	8
1:41			0	0	0	0.0	0			0	0	0	0.0	0	28	432	15	1	4	28	432	15	1	4	56	864	29	1.1	8
1:42			0	0	0	0.0	0			0	0	0	0.0	0	28	432	15	1	4	28	432	15	1	4	56	864	29	1.0	7
1:43			0	0	0	0.0	0			0	0	0	0.0	0	28	432	15	1	4	28	432	15	1	4	55	864	29	1.0	7
1:44			0	0	0	0.0	0			0	0	0	0.0	0	28	432	15	0	4	28	432	15	0	4	55	864	29	1.0	7
1:45			0	0	0	0.0	0			0	0	0	0.0	0	27	432	15	0	3	27	432	15	0	3	55	864	29	0.9	7
1:46			0	0	0	0.0	0			0	0	0	0.0	0	27	432	15	0	3	27	432	15	0	3	54	864	29	0.9	7
1:47			0	0	0	0.0	0			0	0	0	0.0	0	27	432	15	0	3	27	432	15	0	3	54	864	29	0.9	7
1:48			0	0	0	0.0	0			0	0	0	0.0	0	27	432	15	0	3	27	432	15	0	3	53	864	29	0.8	6
1:49			0	0	0	0.0	0			0	0	0	0.0	0	26	432	15	0	3	26	432	15	0	3	53	863	29	0.8	6
1:50			0	0	0	0.0	0			0	0	0	0.0	0	26	432	15	0	3	26	432	15	0	3	52	863	29	0.8	6
1:51			0	0	0	0.0	0			0	0	0	0.0	0	26	432	14	0	3	26	432	14	0	3	52	863	29	0.7	6
1:52			0	0	0	0.0	0			0	0	0	0.0	0	26	432	14	0	3	26	432	14	0	3	51	863	29	0.7	6
1:53			0	0	0	0.0	0			0	0	0	0.0	0	25	432	14	0	3	25	432	14	0	3	51	863	29	0.7	5
1:54			0	0	0	0.0	0			0	0	0	0.0	0	25	431	14	0	3	25	431	14	0	3	50	863	29	0.6	5
1:55			0	0	0	0.0	0			0	0	0	0.0	0	25	431	14	0	2	25	431	14	0	2	50	863	29	0.6	5
1:56			0	0	0	0.0	0			0	0	0	0.0	0	25	431	14	0	2	25	431	14	0	2	50	863	29	0.6	5
1:57			0	0	0	0.0	0			0	0	0	0.0	0	25	431	14	0	2	25	431	14	0	2	49	863	29	0.5	5
1:58			0	0	0	0.0	0			0	0	0	0.0	0	24	431	14	0	2	24	431	14	0	2	49	862	29	0.5	4
1:59			0	0	0	0.0	0			0	0	0	0.0	0	24	431	14	0	2	24	431	14	0	2	48	862	29	0.4	4
2:00			0	0	0	0.0	0			0	0	0	0.0	0	24	431	14	0	2	24	431	14	0	2	48	862	29	0.4	4
2:01			0	0	0	0.0	0			0	0	0	0.0	0	24	431	14	0	2	24	431	14	0	2	47	862	29	0.4	4
2:02			0	0	0	0.0	0			0	0	0	0.0	0	23	431	14	0	2	23	431	14	0	2	47	862	29	0.4	4
2:03			0	0	0	0.0	0			0	0	0	0.0	0	23	431	14	0	2	23	431	14	0	2	47	862	29	0.3	3
2:04			0	0	0	0.0	0			0	0	0	0.0	0	23	431	14	0	2	23	431	14	0	2	46	862	28	0.3	3
2:05			0	0	0	0.0	0			0	0	0	0.0	0	23	431	14	0	2	23	431	14	0	2	46	862	28	0.3	3
2:06			0	0	0	0.0	0			0	0	0	0.0	0	23	431	14	0	1	23	431	14	0	1	46	862	28	0.2	3
2:07			0	0	0	0.0	0			0	0	0	0.0	0	23	431	14	0	1	23	431	14	0	1	45	862	28	0.2	3
2:08			0	0	0	0.0	0			0	0	0	0.0	0	22	430	14	0	1	22	430	14	0	1	44	860	28	0.2	3
2:09			0	0	0	0.0	0			0	0	0	0.0	0	21	429	14	0	1	21	429	14	0	1	42	858	27	0.2	2
2:10			0	0	0	0.0	0			0	0	0	0.0	0	19	425	13	0	1	19	425	13	0	1	38	850	26	0.1	2
2:11			0	0	0	0.0	0			0	0	0	0.0	0	16	419	13	0	1	16	419	13	0	1	33	837	25	0.1	2
2:12			0	0	0	0.0	0			0	0	0	0.0	0	14	407	12	0	1	14	407	12	0	1	28	814	23	0.1	2
2:13			0	0	0	0.0	0			0	0	0	0.0	0	12	390	11	0	1	12	390	11	0	1	23	781	21	0.1	2

SHUTDOWN

Time	LEAD CTG - INSTANTANEOUS						LAG CTG - INSTANTANEOUS						LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	CT Load	NO_X	CO	VOC	SO_2	PM_{10}	CT Load	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
		lb/hr	lb/hr	lb/hr	lb/hr	lb/hr		lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
2:14		0	0	0	0.0	0		0	0	0	0.0	0	10	374	9	0	1	10	374	9	0	1	20	749	18	0.1	2
2:15		0	0	0	0.0	0		0	0	0	0.0	0	8	358	7	0	1	8	358	7	0	1	16	717	14	0.1	1
2:16		0	0	0	0.0	0		0	0	0	0.0	0	6	339	5	0	1	6	339	5	0	1	12	677	11	0.1	1
2:17		0	0	0	0.0	0		0	0	0	0.0	0	5	315	4	0	1	5	315	4	0	1	9	630	9	0.0	1
2:18		0	0	0	0.0	0		0	0	0	0.0	0	3	276	3	0	0	3	276	3	0	0	7	551	7	0.0	1
2:19		0	0	0	0.0	0		0	0	0	0.0	0	3	220	3	0	0	3	220	3	0	0	5	441	6	0.0	1
2:20		0	0	0	0.0	0		0	0	0	0.0	0	2	165	2	0	0	2	165	2	0	0	4	331	4	0.0	1
2:21		0	0	0	0.0	0		0	0	0	0.0	0	1	110	1	0	0	1	110	1	0	0	3	220	3	0.0	0
2:22		0	0	0	0.0	0		0	0	0	0.0	0	1	55	1	0	0	1	55	1	0	0	1	110	1	0.0	0
2:23		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:24		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:25		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:26		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:27		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:28		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:29		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:30		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:31		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:32		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:33		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:34		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:35		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:36		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:37		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:38		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:39		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:40		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:41		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:42		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:43		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:44		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:45		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:46		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:47		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:48		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:49		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:50		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:51		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:52		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:53		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:54		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:55		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:56		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:57		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:58		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
2:59		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:00		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:01		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:02		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:03		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:04		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:05		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:06		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:07		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:08		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:09		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:10		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:11		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:12		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:13		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:14		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:15		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:16		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:17		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:18		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:19		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:20		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0

SHUTDOWN

Time	LEAD CTG - INSTANTANEOUS						LAG CTG - INSTANTANEOUS						LEAD CTG 1-HR AVERAGE					LAG CTG 1-HR AVERAGE					2 CTGs - 1 HR AVERAGE				
	CT Load	NO_X	CO	VOC	SO_2	PM_{10}	CT Load	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}	NO_X	CO	VOC	SO_2	PM_{10}
		lb/hr	lb/hr	lb/hr	lb/hr	lb/hr		lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
3:21		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:22		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:23		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:24		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:25		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:26		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:27		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:28		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:29		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0
3:30		0	0	0	0.0	0		0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0

		NO_X	CO	VOC	SO_2	PM_{10}		NO_X	CO	VOC	SO_2	PM_{10}		NO_X	CO	VOC	SO_2	PM_{10}
LEAD	lb	23	431	14	0	1	**LAG**	23	431	14	0	1	**MAX**	65	866	30	2.1	12
TOTAL	lb	46	862	28	0	3												
	ton	0.0	0.4	0.0	0.0	0.0												

Notes
1) Emissions during shutdown highlighted in gray
2) Emissions during normal operation (> 60% CTG load) shown for purposes of evaluating worst case 1-hr emission rates

Appendix K-4
Greenhouse Emissions

Step 1. identify all types of fuel directly combusted.

Natural Gas

Step 2. Determine annual consumption of the fuel

	Max Fuel Flow HHV	Hours of Operation	Fuel Consumed	Total Fuel Consumed
1 Turbine (no duct burner)	2,046.3 MMBtu/hr	3,791 hr/yr	7,757,523.3 MMBtu	2 Turbines 36,813,447 MMBtu
1 Turbine (with duct burner)	2,662.3 MMBtu/hr	4,000 hr/yr	10,649,200 MMBtu	
Boiler	56 MMBtu/hr	4,000 hr/yr	224,000 MMBtu	224,000 MMBtu
Total				37,037,447 MMBtu

Step 3. Select the appropriate emission factors for each fuel from Tables 5.1 and 5.3.
Find the emission factors for natural gas (boiler and large gas fired turbines > 3MW)

Step 4. Calculate fuel's carbon dioxide emissions

Total Emissions (metric tons) = Adjusted Emission Factor (kg CO_2/MMBtu) x Fuel Consumed (MMBtu) × 0.001 metric tons/kg
= 53.05 kg CO_2/MMBtu × 37,037,447 MMBtu × 0.001 metric tons/kg = **1,964,836.54 metric tons CO_2**

Step 5a . Calculate fuel's methane emissions.

1) Boiler

Total Emissions (metric tons) = Adjusted Emission Factor (kg CH_4/MMBtu) × Fuel Consumed (MMBtu) × 0.001 metric tons/kg
= 0.001021 kg CH_4/MMBtu × 224,000 MMBtu × 0.001 metric tons/kg = 0.228704 metric tons CH_4

2) Turbines

Total Emissions (metric tons) = Adjusted Emission Factor (kg CH_4/MMBtu) × Fuel Consumed (MMBtu) × 0.001 metric tons/kg
= 0.003901 kg CH_4/MMBtu x 36,813,447 MMBtu × 0.001 metric tons/kg = 143.6093 metric tons CH_4

Total CH4 Emissions = 143.8380 metric tons CH_4

Step 5b. Calculate fuel's nitrous oxide emissions.

1) Boiler

Total Emissions (metric tons) = Adjusted Emission Factor (kg N_2O/MMBtu) × Fuel Consumed (MMBtu) × 0.001 metric tons/kg
= 0.000980 kg N_2O /MMBtu × 224,000 MMBtu × 0.001 metric tons/kg = 0.21952 metric tons N_2O

2) Turbines

Total Emissions (metric tons) = Adjusted Emission Factor (kg N_2O /MMBtu) × Fuel Consumed (MMBtu) × 0.001 metric tons/kg
= 0.001361 kg N_2O /MMBtu × 36,813,447 MMBtu × 0.001 metric tons/kg = 50.1031 metric tons N_2O

Total N_2O Emissions = 50.3226 metric tons N_2O

Step 6. Convert CH_4 and NO Emissions to CO_2e and sum the subtotals.

Metric Tons of CO_2 = 1,964,836.54 metric tons CO_2
CH_4 Tons of CO_2e = metric tons CH_4 × 21 = 143.8380 × 21 = 3,020.5972 metric tons
N_2O Tons of CO_2e = metric tons N_2O × 310 = 50.3226 × 310 =15,600.0126 metric tons

Total = 1,983,457.15 metric tons of CO_2e

Appendix K-5
Modeling Protocol

AIR QUALITY MODELING PROTOCOL FOR THE ETIWANDA POWER PROJECT SAN BERNARDINO COUNTY, CALIFORNIA

PREPARED FOR:

- **SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT**
- **CALIFORNIA ENERGY COMMISSION**
- **U.S. ENVIRONMENTAL PROTECTION AGENCY REGION IX**

PREPARED ON BEHALF OF
RELIANT ENERGY, LLC

BY:
URS CORPORATION
1615 MURRAY CANYON ROAD
SAN DIEGO, CALIFORNIA 92108

URS PROJECT NO. 28067169.20100

MARCH 20, 2007

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Appendices

Appendix A Annual and Seasonal Windroses for the Ontario International Airport (1994-1999)

$\mu g/m^3$	Micrograms per cubic meter
AAQS	Ambient Air Quality Standards
ACC	Air-cooled condenser
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
AFC	Application for certification
AQRV	Air quality related values
ARB	Air Resources Board
ARM	Ambient Ratio Method
ATC	Authority to construct
BACT	Best available control technology
BPIP	Building profile input program
BPIP-Prime	Building Parameter Input Program – Prime
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CEC	California Energy Commission
CO	Carbon monoxide
CTG	Combustion turbine generator
°C	degrees Celsius
DCS	Distributed Control System
DLN	Dry, low-NO_x
DOC	Determination of compliance
EC	Element carbon
EGS	Etiwanda Generating Station
EPP	Etiwanda Power Project
ERC	Emission reduction credit
FLM	Federal Land Manager
GEP	Good engineering practice
g/s	Gram per second
HARP	Hotspots analysis and reporting program
HHV	Higher heating value
HRA	Health risk assessment
HRSG	Heat recovery steam generator
ISCST3	Industrial Source Complex Short Term 3rd version
IWAQM	Interagency Workgroup on Air Quality Modeling
km	Kilometers
LCC	Lambert Conformal Conic
LORS	Laws, ordinances, regulations, and standards
MEI	Maximally exposed individual
mm	Millimeter
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NNSR	Non-attainment New Source Review
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides

NPS	National Park Service
NSR	New source review
O_3	Ozone
OEHHA	Office of Environmental Health Hazard Assessment
OLM	Ozone limiting method
Pb	Lead
$PM_{2.5}$	Particulate matter less than 2.5 μm in diameter
PM_{10}	Particulate matter less than 10 μm in diameter
ppb	Parts per billion
ppm	Parts per million
PMS	Particulate Matter Speciation
PSD	Prevention of significant deterioration
ROC	Reactive organic compound
SCAQMD	South Coast Air Quality Management District
SCR	Selective catalytic reduction
SIL	Significant impact level
SO_2	Sulfur dioxide
SOA	Secondary organic aerosol
STG	Steam turbine generator
TAC	Toxic air contaminants
T-BACT	Best available control technology for toxics
tpy	Tons per year
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
ZOI	Zone of impact

SECTION 1 INTRODUCTION

1.1 BACKGROUND

The Etiwanda Power Project (EPP) will be a nominal 615 -megawatt (MW) combined cycle power plant to be constructed almost entirely within the existing Reliant Energy Etiwanda Generating Station (EGS) property in Rancho Cucamonga, San Bernardino County, California. The EPP will consist of a 2 x 1 configuration, consisting of two combustion turbine generators (CTG), two supplementally-fired heat recovery steam generators (HRSGs), one steam turbine generator (STG) and ancillary equipment. The EGS site area is approximately 60 fenced acres located about 1 mile east of Interstate 15 (I-15) and approximately 1.5 miles north of Interstate 10 (I-10). Please refer to Figure 1.

The project is subject to the site licensing requirements of the California Energy Commission (CEC). The CEC will coordinate its independent air quality evaluations with the South Coast Air Quality Management District (SCAQMD) through the Determination of Compliance (DOC) process. As noted above the EPP will occur at an existing power generating station. The annual emission increases of several criteria pollutants resulting from this expansion will potentially be above the emission level thresholds for a Major Modification, as this term is defined in the United States Environmental Protection Agency's (USEPA) Prevention of Significant Deterioration (PSD) regulations. Specifically, the EPP will have a potential to emit greater than 100 tons per year (tpy) of carbon monoxide (CO), greater than 40 tons per year of nitrogen oxides (NO_x), and greater than 15 tons per year of particulate matter with diameter less than 10 microns (PM_{10}). The Reactive Organic Compounds (ROC) and Sulfur Oxides (SO_x) emissions are expected to be less than 40 tons per year. These annual emissions estimates are based on the following annual operating assumptions:

- 10 cold starts, 50 warm starts, 200 hot starts, and 260 shutdowns per year,
- 4,000 hours/year at 100% duct burner capacity and
- 3,446 hours/year operating at 100% combustion turbine load at 63 ºF.

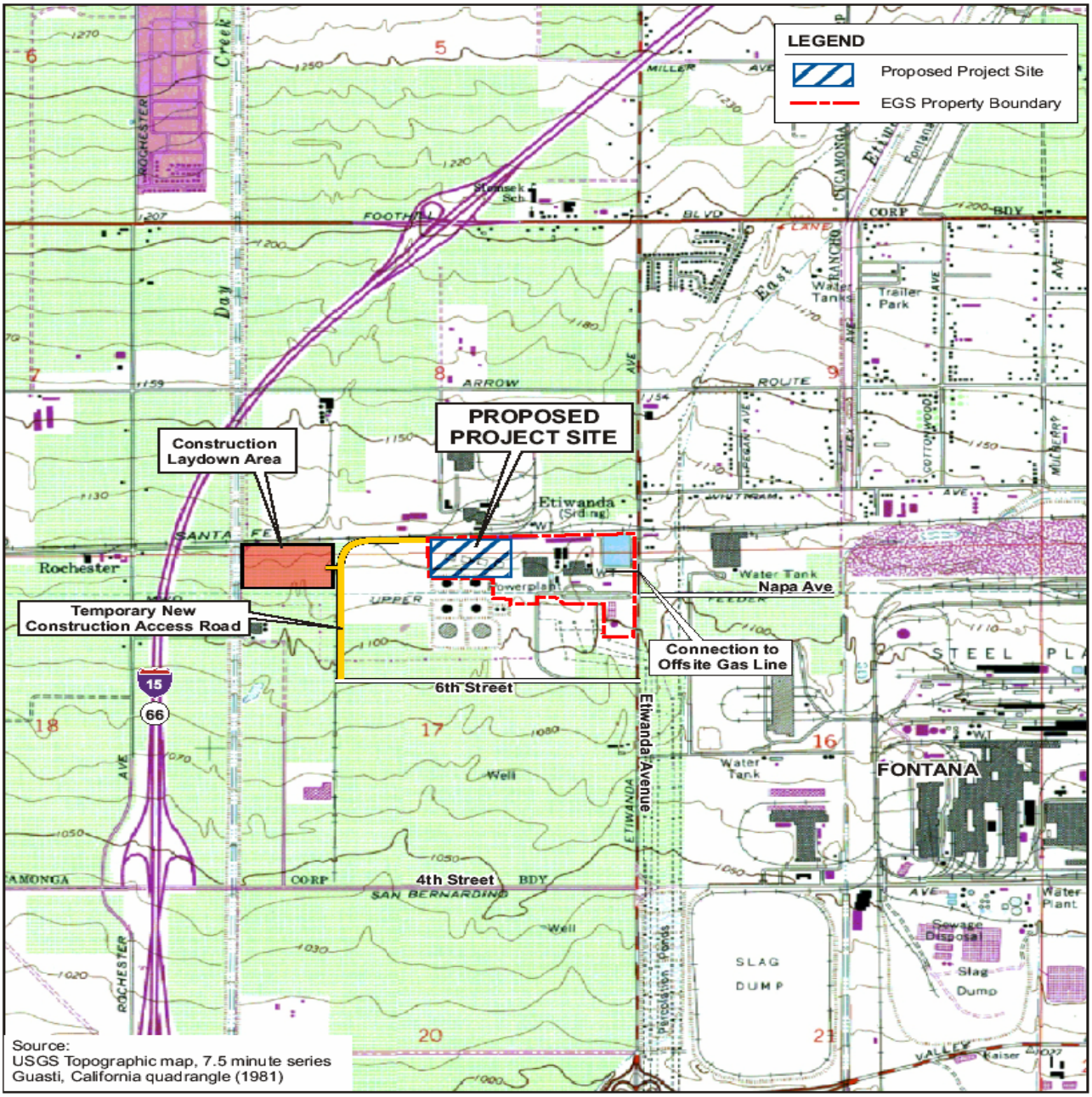
Since the project triggers PSD review, the air dispersion modeling for this project will be conducted in conformance with PSD requirements. For example, worst-case predicted impacts will be compared with the applicable monitoring exemption limits to demonstrate that the project will be exempt from the requirements relating to pre-construction ambient air quality monitoring. The PSD regulations apply only to those pollutants for which the project area is in attainment of the National Ambient Air Quality Standards (NAAQS). State and local new source review (NSR) and non-attainment NSR (NNSR) regulations potentially apply to all criteria pollutants, depending on the quantity of pollutants emitted. The area around the EPP is classified as attainment with respect to the NAAQS for nitrogen dioxide (NO_2), CO, and SO_2, and non-attainment for ozone (O_3), particulate matter less than 2.5 and 10 micrometers in diameter ($PM_{2.5}$ and PM_{10} respectively). With respect to the California Ambient Air Quality Standards (CAAQS), the area around the EPP is classified as attainment for NO_2, CO, sulfates, lead (Pb), hydrogen sulfide, and SO_2, and non-attainment for O_3, PM_{10}, and $PM_{2.5}$. NO_2 and SO_2 are regulated as PM_{10} precursors, and NO_2 and ROC as O_3 precursors. Project emissions of non-attainment pollutants and their precursors will be offset to satisfy state and local NNSR regulations.

1.2 PURPOSE

The CEC and SCAQMD both require the use of atmospheric dispersion modeling to demonstrate that a new power generation facility or modification to an existing facility will comply with applicable air quality standards and to determine the potential impacts on human health from the toxic air contaminants that will be emitted by such projects. In addition, CEC power plant siting regulations require that the cumulative impacts of the proposed project and reasonably foreseeable projects within 10 km of the project site be assessed via modeling.

This document summarizes the procedures that are proposed for the air dispersion modeling for project certification and permitting. Modeling of both operation and construction emissions due to the proposed power plant will be performed in accordance with CEC guidance (CEC, 1997) and the proposed guidance (CEC, 2006). This protocol is being submitted to the CEC and SCAQMD for their review and comment prior to completion of the applicable permit applications. In addition, the protocol will also be provided to US Environmental Protection Agency Region IX, because of the need to obtain a PSD permit for the proposed project. The proposed model selection and modeling approach is based on review of applicable regulations and agency guidance documents, and discussions with agency staff.

Figure 1
General Vicinity – Etiwanda Power Plant Project



0 2000 4000
Scale in Feet
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N

PROJECT LOCATION MAP

March 2007
28067169

Etiwanda Expansion Project
Reliant Energy
San Bernardino County, California

URS

FIGURE 2.2-1

3/06/07 vsa ..\Reliant Etiwanda\Graphics\2.0 Facility Description\2.2-1_plm.cdr

SECTION 2 PROJECT DESCRIPTION

2.1 PROJECT LOCATION

The location of the proposed project is shown on Figure 1, which also illustrates the project site, and nearby roads and other features. The EPP will be almost entirely within the existing Reliant Energy Etiwanda Generating Station (EGS) property in Rancho Cucamonga, San Bernardino County, California. The EGS site is bordered by Etiwanda Avenue to the East, an existing SCE switchyard and vacant SCE-owned land to the South, undeveloped SCE owned land to the West, a parcel to the southwest owned by Inland Empire Utilities District containing two water tanks, and Burlington Northern Santa Fe Railroad tracks to the North. The EGS site is approximately 60 acres in size. Primary access to the site areas during construction will be from the south via 6th Street. The EGS Plant permanent access will remain on Etiwanda Avenue.

The EPP project will be constructed in the area previously occupied by the Units 1 and 2 cooling towers. Construction of the combined cycle plant will be generally within the footprint of the plant area to the west of Units 3 and 4, both of which will be unaffected by the addition of the new units. Units 1, 2 and 5 were retired in 2004 Net station power output will increase by approximately 615 MW over the existing plant capacity of 640MW with the addition of the combined cycle plant.

2.2 DESCRIPTION OF THE PROPOSED SOURCES

The proposed power generation facility (power block) consists of two CTGs (new units designated as Units 61 and 62,) equipped with dry low NO_X combustors and inlet air evaporative coolers; two HRSGs equipped with duct burners; one STG (new unit designated as Unit 60) and an air cooled condenser; and associated auxiliary systems and equipment. The exclusive fuel for the CTGs and duct burners will be pipeline-quality natural gas.

Units 61 and 62 will be Siemens Model 5000F CTGs, each with an ISO baseload gross output of approximately 180 MW. Each CTG will be designed and constructed to burn a single fuel (i.e., natural gas) with an evaporative cooling system installed on the inlet air for use when the ambient temperatures exceed 59°F. The maximum fuel flow rate for each turbine will be 1,960 MMBtu/hr (higher heating value, HHV). A combined cycle configuration will be established with the addition of HRSGs to the exhaust outlets of Units 61 and 62 and the addition of the Unit 60 STG.

A dry, low NO_X (DLN) combustor system will be used to control the nitrogen oxide (NO_X) emissions from each CTG. An additional post-combustion NO_X control system, a selective catalytic reduction (SCR) system will be provided in each HRSG to further reduce the NO_X emissions to the atmosphere. The SCR system for each HRSG will inject an aqueous ammonia solution into the exhaust gas stream upstream of a catalyst bed to reduce NO_X to inert nitrogen and water. An oxidation catalyst system will also be incorporated into the air quality control system to control emissions of CO and ROC.

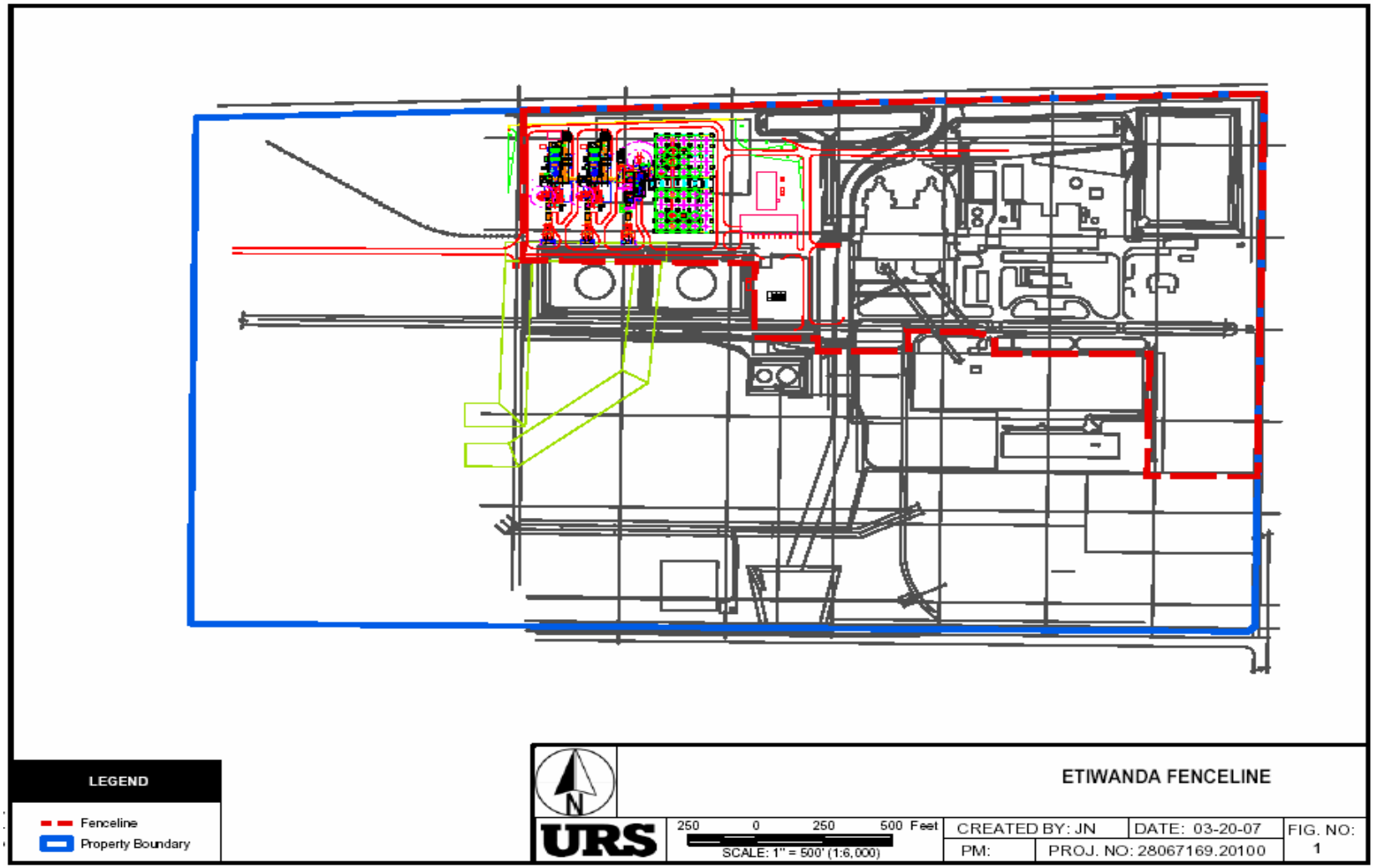
A water treatment system will be installed to create demineralized water for the combustion and steam processes. The system will be located in a new water treatment building on the EPP site. Demineralized and evaporative cooling water tanks and associated pumps will be located adjacent to the water treatment

building. Water treatment chemicals will be contained in totes and stored in curbed areas to prevent the spread of any potential spills. Spilled chemicals will drain to a sump for removal off site. A multi-celled dry cooling tower will be constructed to perform the required cooling for the CTGs, STG and associated equipment.

Natural gas compressors will be required to compress the natural gas to the pressures required by the CTGs. A natural gas fired auxiliary boiler will be provided to enhance start up of the EPP. A control building will be erected to house the Distributed Control System (DCS) controlling the plant as well as house associated plant electrical equipment, warehouse and shop.

Figure 2 shows the proposed locations of the proposed new generating units relative to the existing facility and the red dashed line indicates the fenceline of the property. [why is there a drawing of what looks like 8 simple cycle turbines on Figure 2?]

Figure 2
Facility Plot Plan and Fenceline



SECTION 3 REGULATORY SETTING

3.1 CALIFORNIA ENERGY COMMISSION REQUIREMENTS

For projects with electrical power generation capacity greater than 50 MW, CEC requires that applicants prepare a comprehensive Application for Certification (AFC) document addressing the proposed project's environmental and engineering features. An AFC must include the following air quality information (CEC, 1997):

- A description of the project, including project emissions of air pollutants and greenhouse gases, fuel type(s), control technologies and stack characteristics;
- The basis for all emission estimates and/or calculations;
- An analysis of Best Available Control Technology (BACT) according to South Coast Air Quality Management District (SCAQMD) Rules;
- Existing baseline air quality data for all regulated pollutants;
- Existing meteorological data, including temperature, wind speed and direction and mixing height;
- A listing of applicable laws, ordinances, regulations and standards (LORS) and a determination of compliance with all applicable LORS;
- An emissions offset strategy;
- An air quality impact assessment (i.e., national and state ambient air quality standards [AAQS] and PSD review) and protocol for the assessment of cumulative impacts of the proposed project along with permitted and under construction projects within a 10 km radius; and
- An analysis of human exposure to air toxics (i.e., health risk assessment [HRA]).

For the EPP, the air quality impact assessment, the cumulative impacts assessment, and the HRA will be performed using dispersion models.

3.2 SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT REQUIREMENTS

The SCAQMD has promulgated requirements under Rule 1303. In general, all equipment with the potential to emit air pollutants is subject to the requirements of this rule, which has the following major requirements that potentially apply to new sources such as the EPP:

- Installation of BACT,
- Ambient air quality impact modeling to demonstrate compliance with NAAQS and CAAQS and to evaluate impacts to plume visibility in Class I areas near the proposed source(s),
- Emission offsets,
- Statewide compliance for all applicant-owned or operated facilities in California,

- Projection of visibility in Class I areas.

Rule 1401 (New Source Review of Toxic Air Contaminants or TACs) establishes allowable risks for new or modified sources of TAC emissions. This rule specifies limits for maximum individual cancer risk (MICR), cancer burden, and non-carcinogenic acute and chronic hazard indices (HIs) for new or modified sources of TAC emissions. The health risks resulting from project emissions, as demonstrated with a risk assessment, must not exceed established threshold values. While Rule 1401 does not specifically require the application of best available control technology for toxics (T-BACT) to any new or modified source that emits carcinogenic TACs, the rule relaxes the MICR risk threshold when T-BACT is applied.

3.3 U.S. ENVIRONMENTAL PROTECTION AGENCY REQUIREMENTS

USEPA has promulgated PSD regulations applicable to Major Sources and Major Modifications in San Bernardino County. The EPP will be a Major Modification Source because of the annual CO and NO_x emission rates. Many of the PSD requirements are the same as the AFC and Rule 1303 requirements described above (e.g., project description, BACT, ambient air quality standards analysis). However, PSD requires the following additional analyses:

- A PSD analysis of the potential impacts from the new emissions from the EPP;
- An analysis of air quality related values (AQRV) to ensure the protection of visibility in federal Class I National Parks and National Wilderness Areas within 100 km of the proposed project;
- An evaluation of potential impacts on soils and vegetation of commercial and recreational value; and
- An evaluation of potential growth-inducing impacts.

SECTION 4 CRITERIA POLLUTANT AIR QUALITY IMPACT ANALYSIS FOR NON-CLASS I AREAS

This section describes the dispersion models and modeling techniques to be used in performing the near-field criteria pollutant impact analysis for the EPP. The objectives of the modeling are to demonstrate that air emissions from the EPP will not cause incremental impacts that exceed the Class II PSD Significant Impact Levels (SILs) nor contribute to exceedances of state and federal ambient air quality standards

In November 2005, the USEPA officially recognized the American Meteorological Society/ Environmental Protection Agency Regulatory Model (AERMOD) as the preferred dispersion model for regulatory applications, replacing the Industrial Source Complex Short Term 3 (ISCST3) model. When contacted prior to preparation of this protocol, SCAQMD staff stated that use of ISCST3 would still be acceptable until complete meteorological input data sets suitable for use with AERMOD have been prepared by SCAQMD staff for areas throughout the District's jurisdiction . However, USEPA officially promulgated requirements to use AERMOD as a near-field dispersion model after a one-year grace period commencing November 9, 2005 and Region IX staff informed us that they would probably not approve any further use of ISCST3 for regulatory applications. Accordingly, the AERMOD will be used for the licensing/permitting analyses associated with the EPP.

4.1 SCREENING MODELING

Screening AERMOD modeling analysis (Version 04300) will be conducted using gridded receptors surrounding the Etiwanda plant facility. Modeling will be conducted with emission parameters corresponding to normal operating emissions of the proposed new turbine/HRSGs for different load conditions and ambient temperatures in order to determine the stack parameters and operating loads that correspond to maximum ground-level impacts from the most important project sources, i.e., the CTGs/HRSGs. The stack parameters that align with the highest offsite impact from these sources for each pollutant and averaging time period will be used for subsequent the refined modeling simulations.

4.2 REFINED MODELING

The purpose of the refined modeling analysis is to demonstrate that air emissions from the EPP will not cause or contribute to an ambient air quality violation. The AERMOD model (version 04300) will be used for the refined modeling of criteria pollutants. The regulatory default option will be selected. Specific modeling techniques for PSD, AAQS, and HRA analyses are discussed below.

Analysis of land use adjacent to the EPP was conducted in accordance with Section 8.2.8 of the Guideline on Air Quality Models (EPA-450/2-78-027R and Auer [1978]), EPA AERMOD implementation guide (2004), and its addendum (2006).

Based on the Auer land use procedure, more than 50 percent of the area within a 3-km radius of the Etiwanda power plant is appropriately classified as urban. Since the Auer classification scheme requires more than 50 percent of the area within the 3-km radius around a proposed new source to be non-rural for an urban classification, the urban mode will be used in the AERMOD modeling analyses. In addition,

land use characteristics for the entire 360 degrees out to a distance of 3 kilometers surrounding both the Ontario Airport and the Etiwanda site is entirely urban. According to the EPA AERMOD implementation guide (2005), AERMOD's urban option will be selected. The following land-use parameter values are proposed to be used with the Ontario meteorological data.

Table 4-1
Etiwanda Land Use Characteristics

Land Use Characteristic	Spring	Summer	Autumn	Winter
Albedo	0.14	0.16	0.14	0.14
Bowen Ratio	2.0	4.0	4.0	2.0
Surface Roughness (m)	1.0	1.0	1.0	1.0

The regulatory default options will be used, including building and stack tip downwash, default wind speed profiles, exclusion of deposition and gravitational settling, consideration of buoyant plume rise and complex terrain. In addition, the model will be instructed to exclude periods of missing meteorological data.

4.2.1 PSD Modeling Analyses

As the proposed project will trigger PSD as a Major Modification, modeling will be required to determine whether its incremental impacts on ambient levels of attainment pollutants (NO_2, SO_2 and CO) will not exceed Class II significant impact levels, or SILs. If these SILs were predicted to be exceeded, then an analysis of increment consumption since the local PSD baseline date would be required. However, it is anticipated that the increased emissions of these pollutants due to the EPP will not cause incremental effects above the federal SILs.

4.2.2 Ambient Air Quality Standards Analysis

In accordance with SCAQMD Rule 1303(b)(1), the proposed EPP will be required to demonstrate compliance with one of the following requirements:

- The project impact plus background must not exceed the most stringent applicable ambient air quality standard for each attainment pollutant (NO2, SO2, CO)
- The incremental effect of each permit unit of the EPP may not exceed the Significant Change in Air Quality Concentration standards (listed in Table 4-2 as SCAQMD Significance Levels) for non-attainment pollutants (PM10)

Compliance with these modeling requirements for attainment pollutants will be demonstrated by determining the maximum impact of the proposed Project at any receptor and adding a conservative background concentration based on recent data from the SCAQMD air quality monitoring station determined to be most representative of pre-project conditions in the project area. Because the EPP will be an addition to an existing operational power plant, separate model simulations will be conducted for the proposed new emission units alone and with the additional emissions contributions of the existing

Etiwanda Units 3 and 4, as well as a new simple cycle turbine peaking unit operated by SCE on adjacent property. The EPP will not be considered to cause or contribute to a near-field ambient air quality violation unless impacts from these sources combined with the background concentration exceed the most stringent ambient air quality standard.

Initially, the modeling will assume full conversion of NO_x to NO_2. Should it be required, 75% of NO_x to NO_2 conversion Ambient Ratio Method (ARM) will be applied. Furthermore, should it be required, NO_2 estimates will be reduced using the USEPA ozone limiting method (OLM) (for either hourly or annual impacts). If 1-hour and annual concentrations do not exceed the applicable ambient air quality standard, then compliance is demonstrated and no further modeling is necessary for NO_2.

For PM_{10}, which is a non-attainment pollutant, the maximum contributions of individual emission units of the proposed EPP will be compared directly with the corresponding Significant Change in Air Quality Concentration standard. If these values are below the significant change thresholds, no further demonstration of compliance for this pollutant is required. Note that emissions reduction credits will be provided by the applicant to provide at least a one-to-one offsetting of all Project emissions increases of NO_x, ROC, PM_{10} and SO_2.

4.2.3 Health Risk Assessment Analysis

The CEC and SCAQMD require a health risk assessment to evaluate TAC emissions from the operation of the project. Contaminants emitted by the project with potential carcinogenic effects or chronic and/or acute non-carcinogenic effects will be considered. This health risk assessment will be performed following the SCAQMD Risk Assessment Procedures for Rules 1401 and 212 (SCAQMD, 2005), Supplemental Guidelines for Preparing Risk Assessments for the Toxics “Hot Spots” Information and Assessment Act (AB2588) (SCAQMD, 2005) and Office of Environmental Health Hazard Assessment (OEHHA), Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA, 2003). As recommended by the SCAQMD guideline, the California Air Resources Board (CARB) Hotspots Analysis and Reporting Program (HARP) (CARB, 2005) will be used to perform a refined SCAQMD Tier 4 and OEHHA Tier 1 health risk assessment for the project. HARP includes two modules: a dispersion module and a risk module. The HARP dispersion module incorporates the USEPA ISCST3 air dispersion model, and the HARP risk module implements the latest Risk Assessment Guidelines developed by OEHHA.

First, ground-level concentrations from the EPP emissions will be estimated using the ISCST3 dispersion model within HARP. The HARP modeling analysis will be consistent with, and use similar appropriate parameters, as the modeling approach discussed above for the AAQS analyses using AERMOD, except incorporating the SCAQMD required ISC control parameter NOCALMS. The same 5 year Ontario meteorological data set was processed for input into ISC, and will be used in this HRA. Based on the impacts determined by the ISCST3 model, the HARP model will be used to estimate the corresponding health risks. The ISCST3 results obtained for the year(s) of meteorological data resulting in the highest 1-hour and annual impacts will be used and receptors will be placed at 25-meter spacing around the facility fenceline and 100-meter spacing outside the fence out to 10 km. All receptors that HARP creates that are inside the fenceline will be excluded. The HARP simulations will also include the census

receptors out to 10 km, and additional receptors will be placed at all sensitive locations (e.g., schools, hospitals, etc.) out to a distance of 3 miles.

Per SCAQMD guidelines, cancer risk will be determined using the "Derived (Adjusted)" calculation method. Chronic non-cancer risks will be calculated with the "Derived (OEHHA)" method. Since EPP is surrounded by urban development, the dairy milk and local meat ingestion and drinking water consumption pathways will not be included in this analysis.

The HRA performed by means of the HARP model will follow the following steps:

- Define the location of the MEI for residents and commercial/industrial (i.e., the location where the highest carcinogenic risk may occur);
- Define the locations of the maximum chronic non-carcinogenic adverse health effects and the maximum acute adverse health effects;
- Calculate concentrations and adverse health effects at locations of maximum impact for each pollutant;
- Calculate cancer burden if cancer risk is predicted to be greater than one in a million;
- Determine the zone of impact for cancer risk if the cancer risk is predicted to be greater than or equal to one in a million; and
- Determine the zone of impact for acute and chronic health risks if the acute or chronic health index is predicted to be greater than or equal to 0.5.

Table 4-2
Relevant Ambient Air Quality Standards and Significance Level

Pollutant	Averaging Time	CAAQS (a,b)	NAAQS (b,c)	PSD Class II Significance Impact Levels (μg/m3)/ (SCAQMD Significance Levels)	PSD Significant Emission Rates (tpy)	PSD Increments (μg/m3)	
						Class I	Class II
CO	8-hour	9.0 ppm (10,000 μg/m^3)	9.0 ppm (10,000 μg/m^3)	500	100		
	1-hour	20 ppm (23,000 μg/m^3)	35 ppm (40,000 μg/m^3)	2,000 / (1,100)			
NO_2[d]	Annual		0.053 ppm (100 μg/m^3)	1	40	2.5	25
	1-hour	0.25 ppm (470 μg/m^3)		(20)[h]			

Pollutant	Averaging Time	CAAQS (a,b)	NAAQS (b,c)	PSD Class II Significance Impact Levels (μg/m3)/ (SCAQMD Significance Levels)	PSD Significant Emission Rates (tpy)	PSD Increments (μg/m3)	
						Class I	Class II
SO_2	Annual		0.03 ppm (80 μg/m^3)	1	40	2	20
	24-hour	0.04 ppm[e] (105 μg/m^3)	0.14 ppm (365 μg/m^3)	5		5	91
	3-hour		0.5 ppm (1,300 μg/m^3)	25		25	512
	1-hour	0.25 ppm (655 μg/m^3)					
PM_{10}	Annual	20 μg/m^3	50 μg/m^3	1	15	4	17
	24-hour	50 μg/m^3	150 μg/m^3	5 / (2.5)		8	30
$PM_{2.5}$	Annual	12 μg/m^3	15 μg/m^3				
	24-hour		65 μg/m^3				
O_3	8-hour	0.07 ppm (137 μg/m^3)	0.08 ppm (157 μg/m^3)	See footnote[f]			
	1-hour	0.09 ppm (180 μg/m^3)	See footnote[g]				

Notes:

a. California standards for ozone (as volatile organic compound), carbon monoxide, sulfur dioxide (1-hour), nitrogen dioxide, and PM10, are values that are not to be exceeded. The visibility standard is not to be equaled or exceeded.

b. Concentrations are expressed first in units in which they were promulgated. Equivalent units are given in parentheses and based on a reference temperature of 25°C and a reference pressure of 760 mm of mercury. All measurements of air quality area to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of mercury (1,013.2 millibar).

c. National standards, other than those for ozone and based on annual averages, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than 1.

d. NO2 is the compound regulated as a criteria pollutant; however, emissions are usually based on the sum of all NOx.

e. At locations where the state standards for ozone and/or PM10 are violated. National standards apply elsewhere.

f. Modeling is required for any net increase of 100 tons per year or more of ROCs subject to PSD.

g. New federal 8-hour ozone and fine particulate matter (PM2.5) standards were promulgated by USEPA on July 18, 1997. The federal 1-hour ozone standard was revoked by USEPA on June 15, 2005.

h. Previous SCAQMD 1-hour NO2 Significant Impact Level in Rule 1303 rescinded for NO2 attainment areas on April 20, 2001.

Blanks = Not applicable

ºC = degrees Centigrade

CAAQS = California Ambient Air Quality Standard

mm = millimeters

NAAQS = National Ambient Air Quality Standard

ppm = parts per million by volume, or micromoles of pollutant per mole of gas

TPY = ton per year

μg/m3 = micrograms per cubic meter

4.3 MODELING EMISSIONS INVENTORY

4.3.1 Operational Project Sources

Operational emissions from the project will be dominated by the CTGs with HRSGs Table 4-3 summarizes preliminary worst case short-term emission estimates from the two proposed turbine/HRSG trains during normal operation, startup/shutdown, and commissioning tests. Conceptual plant design includes SCR for NO_x and oxidation catalysts for CO that will comply with recent BACT determinations for similar projects in California and elsewhere. Emissions of SO_2 and PM_{10} will be maintained at low, levels, owing to the exclusive use of interstate pipeline quality natural gas as fuel for the gas turbines. Table 4-4 summarizes the estimated annual emissions from all project sources for each criteria pollutant.

Table 4-3
Worst-Case Short-Term Emission Estimates (For Both Turbines/HRSGs) – Normal Operation, Startup/Shutdown, and Commissioning

	Startup Emissions			Shutdown Emissions		Normal Operations Emissions	Commissioning Emissions
Pollutant	Maximum Emission Rate (lb/hr/2CTs)	Duration (min) [type of startup]	Total Startup Emissions (lb/startup /2CTs)	Maximum Rate (lb/hr/2CT)	Total Shutdown Emissions (lb/shutdown /2CTs) – 20 min duration	Maximum Rate from Normal Operation- 100% load with duct burner at 25°F (lb/hr/2CTs)	Commissioning (lb/hr/1CT)
NO_x	116	150 [Cold]	216	62	44	37.4	130
CO	1605	120 [Warm]	2000	916	911	19.9	3520
	1557	150 [Cold]	2605				
SO_2	2.0	150 [Cold]	2	2	0	2.9	1.4
PM_{10}	9	150 [Cold]	15	8	3	7.7	5

Table 4-4
Approximate Annual Project Emissions Increases for Both Turbines/HRSGs and one Auxiliary Boiler

Pollutant	Annual Emissions (tpy)	
	2 Turbines	Auxiliary Boiler
NOx	133	1.39
CO	287	4.75
SO2	9	0.08
PM10	29	0.64
VOC	28	0.51

4.3.2 Project Construction Sources

Temporary construction emissions will result from heavy equipment exhaust (primarily NO_x emissions and diesel particulate emissions) and fugitive dust (PM_{10}) from earthmoving activities and vehicle traffic on paved and unpaved surfaces. A detailed Excel Workbook will be created to estimate criteria pollutant emissions for the different non-overlapping phases of Project construction, based on information from the Project design engineers on the equipment use by month during the construction schedule and the area extent of ground disturbance that will occur during different construction phases. Depending on the magnitude of emissions for different pollutants and the proximity of construction activities to the property boundary for each phase, one or more emission scenarios representing reasonable worst-case activity and ground disturbance for each averaging time will be selected for subsequent dispersion modeling to estimate the maximum off-site air quality impacts of these temporary activities. The emissions estimates for these scenarios will be modeled using AERMOD with same near-field receptor grids and the same meteorological input data used for the modeling of the Project's operational emissions. The construction site, parking area, and lay-down area will be modeled as area or volume sources. Ultra-low sulfur diesel fuel (15 ppm by weight or less) will be utilized on any emission calculations for construction equipment used at the EPP site.

4.3.3 Toxic Air Contaminants

TACs will also be emitted from the operational EPP project due to combustion of natural gas. However, only small quantities of TACs will be emitted from these sources, primarily benzene, formaldehyde, and polycyclic aromatic hydrocarbons, because only natural gas will be used as fuel for the CTG/HRSG trains and the auxiliary boiler. No new diesel equipment is proposed as part of the project. Emission estimates for TACs from these sources will be based on emission factors available from SCAQMD, CARB and/or vendor data, if available.

4.3.4 Cumulative Impact Analysis Including Off-Property Sources

A cumulative modeling analyses will be performed using AERMOD to evaluate the combined impacts of the EPP Project emissions increases with those of the existing Etiwanda Power Plant Units 3 and 4 and a new peaking turbine proposed by SCE on the adjacent SCE property, as well as any other new sources within 6 miles from the EPP that are currently either under construction, undergoing permitting or expected to be permitted in the near future. Requests will be made to the SCAQMD and to the City of Rancho Cucamonga and adjacent cities within 6 miles of the Project site asking for lists of all such new or planned sources. When received, these lists will be forwarded to CEC for review. Based on this information, and the CEC response, additional sources may be included in the cumulative source modeling analysis.

4.4 BUILDING WAKE EFFECTS

The effect of building wakes (i.e., downwash) upon the stack plumes of emission sources at the facility will be evaluated in accordance with USEPA guidance (USEPA, 1985). Direction-specific building data will be generated for stacks below good engineering practice (GEP) stack height using the most recent version of USEPA Building Parameter Input Program – Prime (BPIP-Prime). Appropriate information

will be provided in the AFC and other permit applications that describe the input assumptions and output results from the BPIP-Prime model. The AERMOD model considers the PRIME downwash algorithm.

4.5 RECEPTOR GRID

The receptor grids that will be used in the AERMOD modeling analyses described in this protocol for operational sources will be as follows:

- 25-meter spacing along the fenceline and extending from the fenceline out to 100 meters beyond the property line;
- 100-meter spacing from 100 m to 1 km beyond the property line;
- 500-meter spacing within 1 to 5 km of project sources; and
- 1,000-meter spacing within 5 to 10 km of project sources.

During the refined modeling analysis for operational Project emissions, if a maximum predicted concentration for a particular pollutant and averaging time is located within the portion of the receptor grid with spacing greater than 25 meters, a supplemental dense receptor grid will be placed around the original maximum concentration point and the model will be rerun. The dense grid will use 25-meter spacing and will extend to the next grid point in all directions from the original point of maximum concentration. The fenceline is shown in Figure 2 as a dashed red line.

Due to the large computation time required to run AERMOD, this receptor grid, with the additional dense nested grid points, was determined to best balance the need to predict maximum pollutant concentrations and allow the all operational modeling runs to be completed in less than one week.

Because construction emission sources release pollutants to the atmosphere from small stacks or from soil disturbances at ground level, maximum predicted construction impacts for all pollutants and averaging times will occur within the first kilometer from the EPP site boundary. Accordingly, only the portion of the above grid with 25 meter spacing out to a distance of 1 km will be used for the construction modeling.

For the HRA modeling, receptors will be placed around the fenceline with 25-meter spacing, and 100-meter spacing will be used outside of the fenceline out to 10 km. All receptors that HARP creates that are inside the fence will be excluded. HARP will also include the census receptors out to 10 km. These census receptors will include the populated areas near the proposed EPP facility location. Discrete receptors will also be placed at all sensitive locations (e.g., schools, hospitals, etc.) out to 3 miles.

A detailed project map and a 7 ½- minute U.S Geological Survey (USGS) map will be provided in the AFC. Actual Universal Transverse Mercator (UTM) coordinates will be used. The CAAQS and NAAQS apply to all locations outside of the applicant's facility, i.e. where public access is not under the control of the applicant, and the south part of the property, to which the public begins to have access. Therefore, the fenceline will be placed inside of the facility's property boundary, and the receptors will be placed on and outside of the fenceline.

4.6 METEOROLOGICAL AND AIR QUALITY DATA

4.6.1 Meteorological Data

Meteorological data suitable for direct input to AERMOD were purchased from Trinity Consulting. Hourly surface data in CD 144 format for calendar years 1994, 1995, 1997, 1998, and 1999 were obtained from the SCAQMD for the Ontario International Airport meteorological station which is located, in the City of Ontario approximately 3.7 miles southwest of the EPP site. The data from this station for 1996 did not meet the 90% data capture rate that is normally required for regulatory permitting in California, and was thus replaced by 1994 data. Concurrent upper air sounding data collected at Edwards Air Force Base, California were used with the Ontario surface data to run the AERMET preprocessor program in order to generate an AERMOD-ready meteorological input file for the selected five year period.

The meteorological data recorded at Ontario International Airport are acceptable for use at EPP facility for two reasons, proximity and terrain similarity. The terrain immediately surrounding the Project site can be categorized as a flat, or gradually sloping urban area. The terrain around the Ontario International Airport is also relatively flat, or gradually sloping urban area. Thus the land use and the location with respect to near-field terrain features are similar. Additionally, there are no significant terrain features separating the Ontario Airport from the EPP facility site that would cause differences in wind or temperature conditions between these respective areas. Therefore the five years of meteorological data selected from the Ontario International Airport were determined to be representative for purposes of evaluating the Project's air quality impacts. The Ontario International Airport is the closest full-time meteorological recording station to the EPP facility site, and thus meteorological conditions at the sites will be very similar.

The Edwards Air Force Base upper air data monitoring station is located approximately 60 miles northwest of EPP facility site. This is the closest upper air station and was determined the most representative data available for use in this modeling analysis.

Seasonal and annual wind roses based on the five years of Ontario Airport surface meteorological data are provided as Appendix A to this protocol document. Winds for all seasons and all years blow predominantly from the west and southwest directions, although the directional pattern is more variable during the winter season.

4.6.2 Air Quality Monitoring Data

Air quality monitoring data from 2002 through 2006 for the Project area was obtained from the USEPA AirData (2006) and the CARB-California Air Quality Data website (2006). The most recent five years of data (2002-2006) from Fontana-Arrow, Upland, Riverside-Rubidoux, and San Bernardino-4th Street monitoring stations were collected to determine the most representative baseline concentrations for each air pollutant and averaging period addressed in the California and National ambient air quality standards. The maximum concentration recorded at these monitoring stations over the five-year period will be used as a conservative representation of existing air quality condition at the proposed Project site.

The Fontana monitoring station is located approximately 4 km to the east of EPP facility site. The Fontana station is the closest station that monitors all the criteria pollutants, except CO. The Upland

station is the next closest station that monitors ambient CO. The Upland station is located approximately 9 km to the west of EPP facility site.

The selected maximum baseline concentrations for all pollutants are summarized in Table 4-5. These data will be added to the modeled maximum impacts from the facility for each pollutant and averaging time, and the totals will then be compared with the applicable AAQS. This is a conservative approach because it assumes that the highest recorded value and the modeled maximum impact both occur at the same time and at the same location. However, since the background concentrations of PM_{10} currently exceed the CAAQS, the PM_{10} and $PM_{2.5}$ impacts are compared to the PM_{10} and $PM_{2.5}$ SILs and the SILs of the SCAQMD.

Table 4-5
Highest Monitored Concentrations Near Etiwanda Area (2002 – 2006)

Pollutant	Averaging Time	Highest Monitoring Concentration	Monitoring Station Address	Year
CO	8-hour	4.5 ppm (5145 μg/m³)	San Bernardino	2003
	1-hour	5.1 ppm (5830 μg/m³)	San Bernardino	2003
NO_2	Annual	0.036 ppm (67.59 μg/m³)	Upland	2002
	1-hour	0.122 ppm (229.09 μg/m³)	Upland	2002
SO_2	Annual	0.004 ppm (10.46 μg/m³)	Rubidoux	2004
	24-hour	0.015 ppm (39.22 μg/m³)	Rubidoux	2004
	3-hour	0.016 ppm (41.83 μg/m³)	Rubidoux	2004
	1-hour	0.024 ppm (62.75 μg/m³)	Rubidoux	2005
PM_{10} (Non-attainment area)	Annual	63.3 μg/m³	Rubidoux	2004
	24-hour	164 μg/m³	Rubidoux	2003
$PM_{2.5}$	Annual	27.4 μg/m³	Rubidoux	2002
(Non-attainment area)	24-hour	104.3 μg/m³	Rubidoux	2003

4.7 FUMIGATION

Fumigation occurs when a stable layer of air lies a short distance above the release point of a plume and unstable air lies below. Especially on sunny mornings with light winds, the heating of the earth's surface causes a layer of turbulence which grows in depth over time and may intersect an elevated exhaust plume, rapidly drawing it down to ground level and creating relatively high pollutant concentrations for a short period. Typically, fumigation analysis is conducted using SCREEN3 when the project site is rural and the stack height is greater than 10 meter. However, since the Etiwanda project site is urban, the SCREEN3 fumigation analysis is not considered to be valid.

SECTION 5 CLASS I AREAS AIR QUALITY IMPACT ANALYSIS

An evaluation of impacts in Class I areas within 100 km of the Etiwanda site will be conducted because the potential emissions increases from the project are sufficient to trigger the federal PSD program. A major modification to an existing PSD source with emissions exceeding the PSD Significant Emissions Increase thresholds must evaluate impacts to visibility and other air quality related values at all Class I areas that are located within a 100-km radius of the facility in order to satisfy the federal PSD program requirements, which are incorporated within SCAQMD Rule 1703 – PSD Analysis. In addition, SCAQMD Rule 1303 requires plume visibility impact analyses for new emission sources proposing to locate within prescribed distances of several specific Class I areas. This section describes the dispersion models and modeling techniques that will be used in performing the Class I area air quality analyses for the EPP. The objectives of the modeling are to demonstrate that air emissions from the EPP will not cause or contribute to a PSD increment exceedance or cause a significant impact on visibility, regional haze or sulfur or nitrogen deposition in any Class I area.

For the plume visibility analysis required by SCAQMD Rule 1303 and the federal PSD program, VISCREEN (Tier 1 and 2) and PLUVUE II (Tier 3) will be used for the Class I areas, which are located within 50 kilometers (km) of the EPP facility. The CALPUFF-Lite (screening model) and CALMET/CALPUFF (full-CALPUFF) model will be used for the Class I areas (or portions thereof) that are outside a 50-km perimeter from the facility. For the PSD analysis, AERMOD will be used for the Class I areas (and portions thereof) that are located within 50 km of the facility, and CALPUFF-Lite or CALPUFF will be used for the Class I areas located more than 50 km from the facility. CALPUFF-Lite will be used for the analyses of the Project's impacts to sulfur and nitrogen deposition in all Class I areas. These planned modeling analyses are summarized in Table 5-1.

Table 5-1
Proposed Model Selection and Receptor Description for Class I Area Analyses

Distance from the Etiwanda Project	Class I Areas	Class I area Air Quality Impact Analysis	Model to be Used	Receptors
Within 50 km	- Cucamonga Wilderness Area - San Gabriel Wilderness Area	PSD Analysis	AERMOD	Discrete receptors in Class I areas
		Deposition	CALPUFF-Lite	Discrete receptors in Class I areas
		Visibility	VISCREEN / PLUVUE	Discrete observer/vista points
Beyond 50 km	- San Gorgonio Wilderness Area - San Jacinto Wilderness Area - Agua Tibia Wilderness Area - Joshua Tree National Park	PSD Analysis	CALPUFF-Lite / CALPUFF	Three rings of receptors for CALPUFF-Lite; Discrete receptors in Class I areas for CALPUFF
		Visibility	CALPUFF-Lite / CALPUFF	
		Deposition	CALPUFF-Lite	

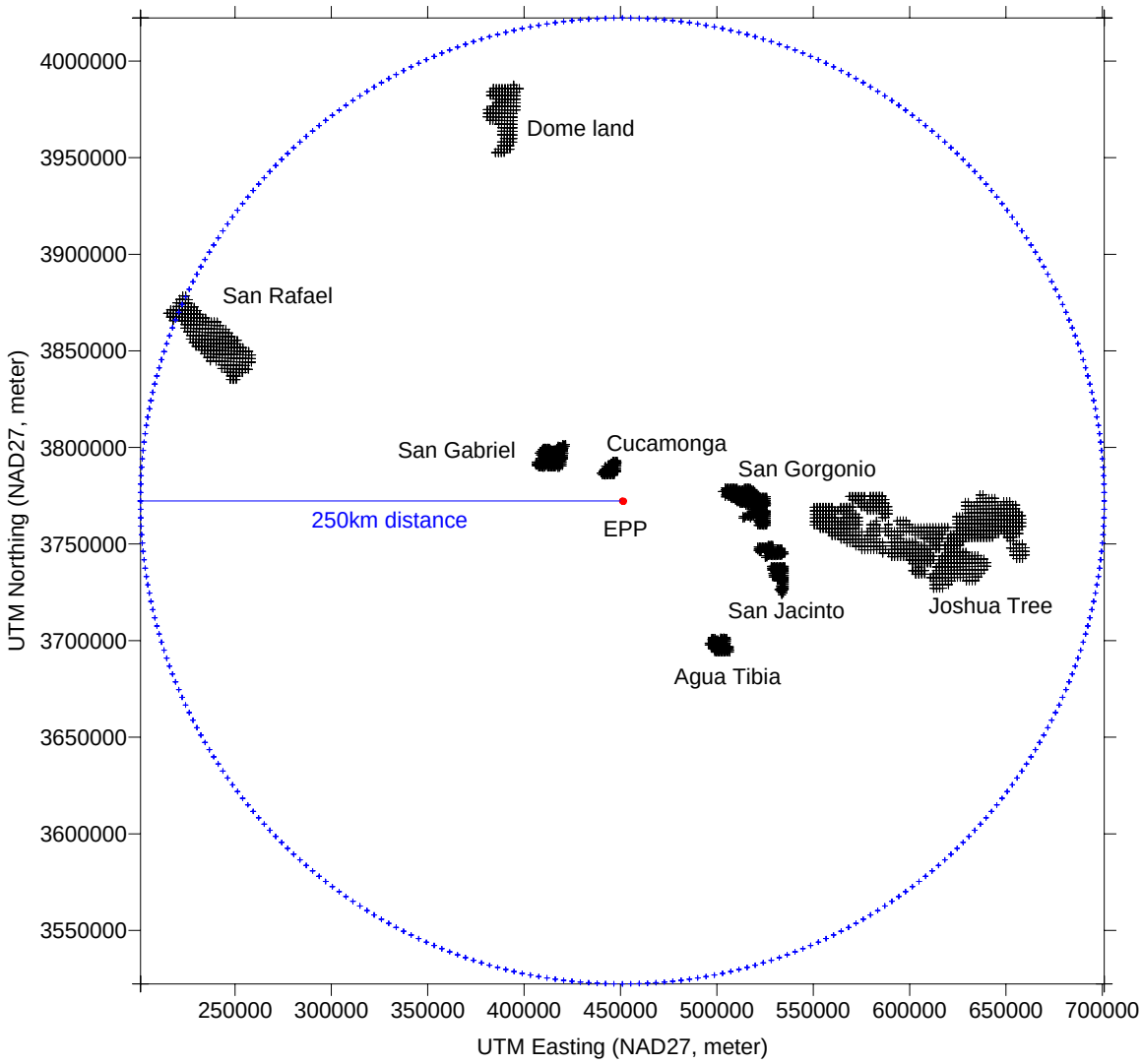
Figure 3 shows the locations of these Class I areas relative to the proposed site location for the EPP and Table 5.2 lists the distances from EPP to the closest and farthest points in each Class I area. The federal authority in charge of the five wilderness areas identified above is the United States Forest Service (USFS) and the National Park Service is in charge of Joshua Tree National Park. The visibility analyses for these six areas will be conducted in a manner consistent with guidance from the NPS and USFS following the procedures set forth in the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report (USFS, 2000).

Table 5-2
Class I Areas Within 100-km Radius of the Facility

Class I areas	Distance from the EPP (km)	
Cucamonga Wilderness Area	Closest	14
	Farthest	21
San Gabriel Wilderness Area	Closest	36
	Farthest	49
San Gorgonio Wilderness Area	Closest	52
	Farthest	76
San Jacinto Wilderness Area	Closest	74
	Farthest	96
Agua Tibia Wilderness Area	Closest	84
	Farthest	96
Joshua Tree National Park	Closest	99
	Farthest	210

The Cucamonga Wilderness Area and San Gabriel Wilderness Area are located within 50 km. The San Gorgonio Wilderness Area, San Jacinto Wilderness Area, Agua Tibia Wilderness Area, and Joshua Tree National Park are located beyond 50 km and within 100 km from the proposed facility. The CALPUFF modeling domain will extend 50 km past the farthest edge in all directions from any of the six Class I areas being analyzed in order to reduce the probability that mass will be lost due to possible wind recirculation. San Rafael Wilderness Area and Dome Land Wilderness Area are located within 250 km of the EPP, but will not be included in the modeling analysis since they lie downwind of Cucamonga and San Gabriel Wilderness Areas. Thus the CALPUFF modeling domain will extend from EPP 100 km to the west, 100 km to the north, 260 km to the east, and 150 km to the south.

Figure 3
Radius of 250 km Surrounding the EPP Showing Class I Area Receptors



5.1 NEAR-FIELD CLASS I AREAS AIR QUALITY IMPACT ANALYSIS (WITHIN 50KM)

5.1.1 Near-Field Class I Areas Visibility and Regional Haze Analysis: Tier I, Tier II and Tier III Visibility Modeling

SCAQMD Rule 1303(b)(5) (C)(i) requires a plume visibility analysis if the net emissions increase from a new source will exceed 15 tpy of PM_{10} or 40 tpy of NO_x, provided that the source is located within specified distances from the nearest boundary of a Federal Class I area. The proposed EPP site is within the distance specified in Rule 1303 for one Class I area, the Cucamonga Wilderness Area. In addition, the Project emissions are expected to exceed the threshold values for both NO_x and PM_{10}. Accordingly, a

plume visibility analysis in Cucamonga Wilderness will be conducted in the manner that meets the requirements of Rule 1303 Appendix B, along with the PSD requirements described below.

As shown in Table 5-2, two Class I areas lie entirely within the near-field, i.e., within 50 km from the proposed facility: Cucamonga and San Gabriel Wilderness Areas. For these two Class I areas a screening-level VISCREEN modeling analysis will be performed to address the proposed project's impacts in terms of plume contrast and color difference index. This analysis is required under SCAQMD Rule 1303, as well as the federal PSD program, which is incorporated in SCAQMD regulations under rule 1703.

Initially, a series of Tier I visibility screening analyses will be conducted to obtain a conservative evaluation of the proposed project's potential to adversely affect visibility in two Class I areas: Cucamonga Wilderness Area and San Gabriel Wilderness Area. The level of analysis entails use of the EPA VISCREEN model with simple, worst-case default input assumptions (i.e., extremely stable [Class F]) atmospheric turbulence conditions and a very low wind speed [1.0 meter per second] persisting for 12 consecutive hours in a direction) that would transport the proposed turbine plumes toward a hypothetical observer at each Class I area. The only inputs required to execute the Tier I analysis with the default parameter settings are: (1) projected short-term maximum turbine emission rates of fine particulate, and nitrogen oxides; per EPA Plume Visual Impact Screening Workbook (EPA, 1988 and 1992) (2) the distances between the project stacks and a hypothetical observer at the nearest and farthest Park boundaries; and (3) representative background visual range for the region(s) of concern.

The VISCREEN output for a Class I analysis provides the results of the following plume impact tests:

- Plume perceptibility based on color differences between the plume and a sky or terrain background (dE).
- Plume contrast relative to a sky or terrain background (C).

The VISCREEN model calculates the color difference index (dE) and the contrast (C) for four different lines of sight corresponding to two types of background (sky and terrain), and two assumed worst-case sun angles (10 degrees and 140 degrees). As part of the standard output, the four lines of sites will be calculated for both the observer's view inside the Class I area and the view outside the area. However, it should be noted that both the NPS and the USFS identify only the view inside the Class I area as the criteria for significance in this analysis.

Based upon the FLAG workbook, the significance criteria for the dE is less than 2 and 0.05 for C. As recommended by the FLAG document, a Tier II screening procedure should be conducted when the potential for impacts greater than the screening criteria is indicated by the results of the Tier I analysis, as described in the Plume Visual Impact Screening Workbook (EPA, 1988 and 1992).

The Tier II procedure is similar to the Tier I analysis, but allows more site-specific input data to be used in place of the extremely conservative default assumptions Specifically, the frequency of occurrence of the different dispersion conditions in the project vicinity will be established and ranked in terms of increasing values of the dispersion parameter '$\sigma_z u$' (i.e., the product of the wind speed (u) and the plume vertical spread parameter (σ_z) for the appropriate stability class) and the source-receptor distance. The

VISCREEN model will be then run for the most restrictive combination of wind speed, wind direction and atmospheric stability that corresponds to a cumulative frequency, with all the other parameter combinations of lesser dispersion parameter values, of 1%. In addition, a background ozone concentration of 0.065 ppm will be incorporated to represent the worst-case 24-hour ozone concentration in the region.

The Tier II procedure consists of analyzing the available meteorological data to incorporate information on the frequency of conditions that may lead to adverse plume impacts in the Class I areas. The required meteorological statistics used for this refinement will be derived from the five-year Ontario International Airport hourly meteorological data set with an upper air data from the Edwards Air force Base, which also will be used for the AERMOD analysis. The hourly meteorological data were measured very near the proposed location and are considered representative of the wind conditions at the site.

This data set will be first analyzed to determine the frequency of various combinations of wind speed and stability in the approximately 30 degree wind direction sectors that would carry the EPP facility plume toward each of the Class I areas located less than 50 km from the EPP site. The frequency distributions will be developed separately for four diurnal time periods (midnight-6:00 am, 6:00 am-noon, noon-6:00 pm, and 6:00 pm-midnight). For each time period, five wind speed categories corresponding to 0-1 meters per second (m/s), 1-2 m/s, 2-3 m/s, 3-4 m/s, and 4-5 m/s will be analyzed for each of six stability classes (Class A-most unstable through Class F-most stable, Class G is considered as Class F) and wind direction compass sector toward the Class I area from the project site. For each time of day and the approximately 30 degree wind direction sector that could transport project emissions toward a Class I area, 14 wind speed/stability combinations will be ranked in order of increasing values of the dispersion parameter, $\sigma_z u$ as described above. The combinations will include F stability for wind speed classes 1 through 4, E stability with wind speed classes 1 through 5, and D stability with wind speed classes 1 through 5, as per the Tier II guidance. Note that the lowest values of this parameter correspond to the most restrictive dispersion conditions. Finally, a table will be constructed showing the percent frequency of occurrence for each combination of stability and wind speed or, alternatively for each value of $\sigma_z u$. These data are tabulated in terms of the frequency of each combination, as well as the cumulative frequency of all combinations with lower values of $\sigma_z u$.

The meteorological condition for each Class I area with a cumulative frequency of 1 or greater, and with a wind speed fast enough to transport the plume to the given park within 12 hours will be selected. The EPP and Cucamonga and San Gabriel Wilderness Areas lie in complex terrain. The elevation gain from the EPP to Cucamonga is greater than 500 meters and there is terrain with an elevation gain of greater than 500 meters between EPP and the front edge of San Gabriel. Per the Plume Visual Impact Screening Workbook (EPA, 1988 and 1992), the worst-case stability class selected may be shifted one category less stable. Thus the VISCREEN model will be run for one stability class less stable and the wind speed determined by the techniques described above for the corresponding Class I areas to determine whether impacts above the model's screening criteria would be predicted. Actual background visual range measurements have been conducted in San Gabriel Wilderness Area. The average measured background visible range value for 2001 – 2003 from the best 20% visibility days at San Gabriel Wilderness Area of 213 km will be used in the simulation for both Cucamonga Wilderness Area and San Gabriel Wilderness Area.

If the plume parameters predicted by VISCREEN are above the screening criteria for locations inside the Class I areas, an analysis using the EPA PLUVUE II plume visibility model will be required to determine whether a less conservative screening approach would result in predicted significant impacts within the two near-field Class I areas. This analysis will involve collaboration with air quality staff of the National Forest Service to identify appropriate observer/vista locations to be analyzed in the PLUVUE II study. According to the FLAG guidance, the significant impact levels for the Tier III analysis are more stringent than those for the Tier 1 and Tier II modeling approach. Thus the delta E and contrast numbers used as significance criteria in the PLUVUE II simulations will be 1.0 and 0.02, respectively.

For Tier I and II visibility modeling, the maximum 24-hour averaged emission rates of NO_2 and PM_{10} from two turbines and one auxiliary boiler will be used, per the Plume Visual Impact Screening Workbook (EPA, 1988 and 1992). For Tier III visibility modeling, the maximum 24-hour averaged emission rates of NO_2, SO_2 and PM_{10} from two turbines and one auxiliary boiler will be used.

Full details of the VISCREEN and PLUVUE simulations and meteorological analyses used in developing realistic worst-case impact scenarios will be provided with model input and output files for the PLUVUE simulations.

5.1.2 Near-Field Class I Areas PSD Analysis: AERMOD

A PSD analysis for Class I areas will be required because the EPP will be a major modification as defined in the PSD regulations. Therefore, the maximum predicted incremental criteria pollutant concentrations from the EPP sources will be compared with the proposed PSD significant impact level for Class I areas (see Table 5-3) for each pollutant as a reference point.

For the Class I areas within 50 km distance of the facility, the PSD analysis will be conducted using the AERMOD model. Receptors for each Class I area will be obtained from the *NPS Convert Class One Areas* database. No modifications to the receptor locations or heights, as provided in the database, will be made. Latitude/longitude of the Class I receptor coordinate will be converted to UTM coordinate based on NAD27 zone 11.

The 3-hour average impact of SO_2, the 24-hour average impacts of SO_2 and PM_{10}, and the annual average impacts of SO_2, PM_{10}, and NO_x will be predicted using corresponding averaging emission rates. The five-year meteorological data used for the Class II area (Section 4.6) will be used for Class I area. The modeled maximum impacts from the proposed EPP site will be compared with the corresponding proposed PSD Class I significant impact levels.

Table 5-3 Proposed Class I Significance Impact Levels

Parameter	Modeled Scenario					
Concentration	NO_x	PM_{10}		SO_2		
	Annual	24-hour	Annual	3-hour	24-hour	Annual
Threshold	0.1	0.3	0.2	1	0.2	0.1

5.2 FAR-FIELD CLASS I AREA AIR QUALITY IMPACT ANALYSIS: CALPUFF MODELING

To analyze visibility and incremental impacts for the Class I areas beyond 50 km from the proposed project site, and deposition and soil and vegetation impacts for the Class I areas within 50 km from the proposed project site, the CALPUFF-Lite model, the screening mode of CALPUFF, will be used. If significant impacts are predicted the refined CALPUFF model will be used in conjunction with the CALMET diagnostic meteorological model. CALPUFF is a transport and dispersion model that simulates the advection and dispersion of "puffs" of material emitted from modeled sources. CALPUFF can incorporate three-dimensionally varying wind fields, wet and dry deposition, and atmospheric gas and particle phase chemistry. When run in the screening mode, CALPUFF-Lite uses data from a single meteorological station. The CALMET model is used to prepare the necessary gridded wind fields for use in the refined CALPUFF model. CALMET can accept as input; mesoscale meteorological data (MM5 data), surface station, upper air, precipitation, cloud cover, and over-water meteorological data (all in a variety of input formats). These data are merged and the effects of terrain and land cover types are estimated. This process results in the generation of gridded 3-D wind field that accounts for the effects of slope flows, terrain blocking effects, flow channelization, and spatially varying land use types.

The EPA-approved regulatory air quality dispersion model CALPUFF (version 5.711a) will be used as per the recommendations in the following regulatory guidance documents. In addition, all supporting Version 5 editions of the pre- and post-processors will be used.

- Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report , and
- Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts.

The IWAQM report recommends CALPUFF for use in long-range transportation and dispersion analyses involving one or more emission sources. Key inputs and model options will be discussed in the air quality impacts analysis section of the permit application. Discussions with the FLMs from the USFS and NPS will help define the appropriate model inputs.

The IWAQM document's recommendations regarding modeling of Class I area impacts include the following paragraph:

> 'Basically, IWAQM's recommendation for a screening analysis is an approach using a simplified set of meteorology with CALPUFF. To encourage the results to be higher than would be estimated using a fully developed CALPUFF and CALMET analysis, rings of receptors are used. The maximum concentration value found anywhere on the receptor rings are used (rather than restricting the analysis to receptors only located within the Class I area(s) of interest)."

The simplified approach described in this passage is the CALPUFF Lite analysis, which is clearly identified by IWAQM as a methodology designed to ensure that peak impacts to air quality in Class I areas will err on the side of conservatism (overprediction). Thus, if air quality and deposition impacts are

shown by CALPUFF Lite modeling to be below the applicable levels of significance for Class I areas, no further analysis should be required.

Copies of all executable files used in the preparation of this modeling analysis will be provided with the final application.

5.2.1 CALPUFF/CALMET Description

5.2.1.1 Location and Land-Use

The CALPUFF models incorporate assumptions regarding land-use classification, leaf-area index, and surface roughness length to estimate deposition during transport. For the CALPUFF-Lite analysis the urban land use and dispersion coefficients will be selected.

For the refined CALPUFF modeling, U.S. Geological Survey (USGS) 1:250,000 scale digital elevation models (DEMs) and Land Use Land Cover (LULC) classification files will be used to develop the geophysical input files required by the CALMET model. Terrain pre-processor (TERREL) and land use pre-processor (CTGPROC) output will be combined in the geo-physical preprocessor (MAKEGEO) to prepare the CALMET geo-physical input file. The CALMET model will incorporate the necessary parameters in the CALMET output files for use in the CALPUFF model.

In the refined CALPUFF modeling the domain will extend from EPP 100 km to the west, 100 km to the north, 260 km to the east, and 150 km to the south. The grid-cells will be 3 kilometers wide. The modeling domain will be specified using the Lambert Conformal Conic (LCC) Project system.

5.2.1.2 Meteorological Data

The screening mode of CALPUFF utilizes enhanced ISC meteorological data. Hourly meteorological data input files will be prepared for use with the CALPUFF air quality dispersion model. Hourly surface data obtained at the Ontario International Airport (WABAN 722861) for the years 1994 through 1999 (except 1996) were combined with twice daily upper-air soundings from Edwards Air Force Base (WABAN 03197) to create the required data set. The input files were prepared by Trinity Consulting using CPRAMMET (Version, 99169) according to EPA approved protocols (EPA 1999) for use with wet/dry deposition models. All missing wind speed, direction, and friction velocity observations were filled using linear interpolation between adjacent hourly observations, and wind speed and friction velocity observation data at some hours were zeroed-out when delta t showed a negative number at the hours.

If refined CALPUFF modeling is required, pursuant to FLM guidance, a three-year meteorological data set will be developed using a combination of surface, upper-air, and mesoscale meteorological (MM5) data for 2001-2003. Surface, upper-air, and MM5 data points will be combined and used in the CALMET model. Hourly surface data from numerous different meteorological stations and precipitation stations for 2001-2003 will be obtained from NCDC and used in CALMET. Three years of MM5 data, 2001-2003 will also be used for CALMET.

CALMET wind fields will be generated using a combination of the MM5 data sets augmented with the surface and upper air data from the National Weather Service (NWS) described above. Per IWAQM guidance, the MM5 data will be interpolated to the CALMET fine-scale grid to create the initial-guess wind fields (IPROG = 14 for MM5).

5.2.1.3 Other Model Options

Size parameters for dry deposition of nitrate, sulfate, and PM_{10} particles will be based on default CALPUFF model options. Chemical parameters for gaseous dry deposition and wet scavenging coefficients will be based on default values presented in the CALPUFF User's Guide. Calculation of total nitrogen deposition will include the contribution of nitrogen resulting from the ammonium ion of the ammonium sulfate compound. For the CALPUFF runs that incorporate deposition and chemical transformation rates (i.e. deposition and visibility), the full chemistry option of CALPUFF will be turned on (MCHEM = 1). The nighttime loss for SO_2, NO_x and nitric acid (HNO_3) will be set at 0.2 percent per hour, 2 percent per hour and 2 percent per hour, respectively. CALPUFF will also be configured to allow predictions of SO_2, sulfate (SO_4), NO_x, HNO_3, nitrate (NO_3) and PM_{10} using the MESOPUFF II chemical transformation module.

The background ammonia level is set to 5.5 ppb, which is averaged value from desert shrub and grass land. The IWAQM report specified the background ammonia concentration of 1 ppb for desert scrub and 10 ppb for grass land. Ozone concentration of 65 ppb for every month will be entered into the CALPUFF-Lite model. Hourly ozone concentration files will be obtained from the California Air Resources Board. Data for the years of 2001- 2003 from Fontana will be used in the refined CALPUFF modeling.

5.2.1.4 Receptors

CALPUFF-Lite will be run in the screening mode to assess the potential for significant visibility degradation due to project emissions. In CALPUFF-Lite, the terrain is represented in each of the Class I Areas as circular rings of receptors spaced at 1 degree intervals at the closest, middle and farthest distances into the Class I area from the modeled source. The elevation assigned to each receptor on a given ring is the highest point on the portion of the ring that lies within the Class I area. The distance between ring receptors and the project location and the elevation and location of the ring receptors are shown in Table 5-4. The use of these model receptor grids is extremely conservative, since it ensures that at least some potential degradation of the visibility will be predicted for any plume reaching the distance of the rings, regardless of the actual wind direction.

Table 5-4
CAPUFF-Lite Ring Receptor Distances and Elevations

Class I areas	Distance from the EPP (km)		Ring Receptor Elevation (m)
San Gorgonio Wilderness Area	Closest	52	2357
	Middle	64	3340
	Farthest	76	1488
San Jacinto Wilderness Area	Closest	74	1261
	Middle	85	2798
	Farthest	96	2017
Agua Tibia Wilderness Area	Closest	84	745
	Middle	90	1358
	Farthest	96	1466
Joshua Tree National Park	Closest	100	1180
	Middle	155	1219

Receptors for all refined CALPUFF modeling of each Class I area will be obtained from the National Park Service's *NPS Convert Class One Areas* database (provided by the NPS). No modifications to the receptor locations or heights, as provided in the database, will be made. Latitude/Longitude of the Class I receptor coordinate will be converted to Lambert Conformal Conic (LCC) coordinate based on domain setup shown in CALMET options. These receptors are shown in Figure 3.

The discrete NPS receptors in Cucamonga Wilderness Area and San Gabriel Wilderness Area will be used in the CALPUFF-Lite modeling for Deposition and Soil and Vegetation Analyses.

5.2.2 Far-Field Class I Areas Visibility and Regional Haze Analysis

For the analysis of visibility effects, CALPUFF requires project emission rate inputs for six pollutant species, i.e., directly emitted PM_{10}, NO_x, and SO_2, and secondary SO_4, HNO_3, and NO_3. Emission rates for PM_{10}, NO_x and SO_2 will be calculated for the 2 turbine/HRSGs of the proposed project operating under maximum load emission conditions and an auxiliary boiler. The maximum 24-hour averaged emission rates will be used for the visibility analysis and the total turbine/HRSG SO_2 emissions will be speciated to SO_2 and SO_4 as indicated in NPS's Particulate Matter Speciation (PMS) guidelines for natural gas turbines (NPS, 2006). The total turbine/HRSG PM_{10} emissions will be speciated to elemental carbon and organic carbon (emitted as Secondary Organic Aerosol (SOA)) per the PMS. For CALPUFF-Lite, the natural gas auxiliary boiler directly emit Fine PM (PMF), NO_x, and SO_2, no speciation will be applied to these emissions. For refined CALPUFF modeling, the natural gas auxiliary boiler emissions will be speciated in a similar manner as the turbine/HRSG emissions per USFS guidance. Direct

emissions of the remaining species, HNO_3 and NO_3, are assumed to be zero for the natural gas burning sources of the EPP.

Modeled impacts will be converted to visibility impacts using the CALPOST post processor. CALPOST will be used to post-process estimated 24-hour averaged ammonium nitrate, ammonium sulfate, EC, and SOA concentrations into each extinction coefficient value for each day at each modeled receptor.

CALPUFF also requires a background light extinction reference level. The analysis will be run using the FLAG recommended background extinction values for each Class I area. The background extinction coefficient is composed of hygroscopic scattering components, where the addition of water enhances particle light-scattering efficiencies, non-hygroscopic scattering components and Rayleigh scattering. Ammonium sulfate and ammonium nitrate compose the hygroscopic scattering components, while organic aerosols, soil, coarse particles, particle absorption primarily from elemental carbon and absorption from gases primarily from nitrogen dioxide compose the non-hygroscopic scattering components.

In accordance with the FLAG guideline the total background extinction coefficient is calculated for each Class I area using the following equation:

$$b_{ext} = b_{hygro} \cdot f(RH) + b_{non\text{-}hygro} + b_{Ray}$$

where:

b_{hygro} = the hygroscopic scattering component (Mm^{-1})
$= 3[(NH_4)_2SO_4 + NH_4NO_3]$
$b_{non\text{-}hygro}$ = the non-hygroscopic scattering component (Mm^{-1})
$= b_{OC} + b_{Soil} + b_{Course} + b_{ap} + b_{ag}$
b_{Ray} = the Rayleigh scattering component (Mm^{-1}) = 10 Mm^{-1} (FLAG)
f(RH) = relative humidity adjustment factor

In the CALPOST post-processor program, the monthly background concentration of ammonium sulfate is set to one third of the hygroscopic scattering component, and the monthly background concentration of soil is set to the non-hygroscopic scattering component, as recommended in the FLAG report. The background soil concentration will be set to the FLAG recommended non-hygroscopic value. The scattering coefficients that will be used in CALPUFF for all four Class I areas beyond 50 km are presented in Table 5-5.

The FLAG RH adjustment factors (MVISBK=2) and the RHMAX = 95 % will be used as suggested by the NPS FLM.

The extinction coefficient percent change (background extinction coefficient vs. modeled extinction coefficient), predicted by CALPUFF will be compared to the level of acceptable change (LAC) of 5 percent.

Table 5-5
Scattering Coefficients used in CALPUFF for Class I Areas

Class I Area	Total Background Extinction (Mm^{-1})	Hygroscopic Scattering Component (Mm^{-1}) = BKSO4	Non-hygroscopic Scattering Component (Mm^{-1}) = BKSOIL	Rayleigh Scattering (Mm^{-1})
San Gorgonio Wilderness Area	15.8	0.2	4.5	10.0
San Jacinto Wilderness Area	15.9	0.2	4.5	10.0
Agua Tibia Wilderness Area	16.0	0.2	4.5	10.0
Joshua Tree National Park	15.7	0.2	4.5	10.0

The FLAG guidance states that:

> "The FLMs are concerned about situations where change in extinction from new source growth is greater than 5%, as compared against natural conditions".

Thus, if predicted impacts obtained by means of a conservative CALPUFF Lite analysis demonstrate that no extinction change greater than 5% will occur in a Class I area, then no further evaluation of regional haze impacts in such Class I areas will be performed

5.2.3 PSD Class I Significance Analysis

A PSD analysis for Class I areas will be required because the EPP will be a major modification as defined in the PSD regulations. Therefore, the maximum predicted incremental criteria pollutant concentrations from the EPP sources will be compared with the Proposed PSD significant impact level for Class I areas (see Table 5-3) for each pollutant as a reference point.

CALPUFF will be used to model ambient air concentrations of NO_2, PM_{10}, and SO_2 in Class I Areas beyond 50 km from the proposed EPP sources to compare against the proposed PSD Class I significant impact level. All NO_2 and PM_{10}, sources will be modeled at full potential-to-emit (PTE) for the CALPUFF PSD modeling. The facility SO_2 emission rate will be portioned into SO_2 and SO_4 emissions according to National Park Service (NPS)'s Particulate Matter Speciation (PMS) guidance for natural gas combustion turbines. The full chemistry option of CALPUFF will be turned on (MCHEM =1, MESOPUFF II scheme), and deposition options will be turned on (MWET = 1 and MDRY = 1).

5.3 DEPOSITION ANALYSIS

For all six Class I areas within and beyond 50 km from the facility, CALPUFF will be used to evaluate the potential for Nitrogen and Sulfur deposition due to EPP Project emissions. Total deposition rates for each pollutant will be obtained by summing the modeled wet and/or dry deposition rates. The annual average emission rates for Project sources will be used since annual deposition rates are to be estimated.

For Sulfur deposition, the wet and dry fluxes of sulfur dioxide (SO_2) and sulfate (SO4) are calculated, normalized by the molecular weight of Sulfur, and expressed as total S. Total Nitrogen deposition is the sum of Nitrogen contributed by wet and dry fluxes of nitric acid (HNO_3), nitrate (NO_3^-), ammonium nitrate (NH_4NO_3) and the dry flux of NO_x.

The total modeled nitrogen and sulfur deposition rates will be compared to the USNPS/USFWS DATs for western states. The DAT for nitrogen and sulfur are each 0.005 kilogram per hectare per year (kg/ha-yr), which is 1.59E-11 $g/m^2/s$. If the maximum predicted values determined by a CALPUFF Lite analysis are below these DATs, no further analysis using CALPUFF will be performed.

5.4 SOILS AND VEGETATION

The designated Wilderness Areas contain vegetative ecosystems as identified by the Federal Land Manager (FLM) (USFS, 1992). For each ecosystem, sensitive species or groups of species will be designated to represent potential impacts to each vegetation species in the ecosystem. These species are impacted primarily by ozone but are also impacted by nitrogen and sulfur compounds. Acidity in rain, snow, cloudwater, and dry deposition can affect soil fertility and nutrient cycling processes in watersheds and can result in acidification of lakes and streams with low buffering capacity. Therefore, the soil and vegetation analysis will be analyzed using the CALPUFF model to predict total sulfur and nitrogen deposition results and monitored ozone concentration. In order to protect sensitive species, the USFS (1992) recommends that short-term maximum SO_2 levels should not exceed 40 to 50 parts per billion (ppb), annual average SO_2 concentrations should not exceed 8 to 12 ppb, and annual average NO_2 concentration should not exceed 15 ppb.

SECTION 6 PRESENTATION OF MODELING RESULTS

6.1 PSD, NAAQS AND CAAQS ANALYSES

The results of the PSD and AAQS analyses to evaluate the construction and operational impacts of the EPP facility will be presented in summary tables. A figure indicating the locations of the maximum predicted pollutant concentrations for each applicable pollutant and averaging time will be provided. The maximum modeled values of NO_2, SO_2 and CO will be compared with SILs. If the model impact exceeds the SILs, the background concentrations (see Section 4.6.2) will be added to the maximum modeled values from the Etiwanda sources to yield total concentrations, which will be compared with the NAAQS and CAAQS. The cumulative impact values from combination of project sources and existing sources in EPP and new sources within 6 miles will be added to the background concentration and will be compared with NAAQS and CAAQS. Maximum modeled PM_{10} concentrations per emission source will be compared with the SCAQMD significance levels.

6.2 HEALTH RISK ASSESSMENT ANALYSIS

Maps at a scale of 1:24,000 will depict the following data:

- Elevated terrain within a 10-km radius of the project;
- Distribution of population within a 10-km radius of the project and sensitive receptors, including schools, pre-schools, etc., within a 3-mile radius of the project;
- Table listing all sensitive receptors within a 3-mile radius of the project;
- Current and future residential land uses;
- Isopleths for any areas where predicted exposures to air toxics result in estimated chronic non-cancer impacts and acute impacts equal to or exceeding a hazard index of 0.5; and
- Isopleths for any areas where exposures to air toxics lead to an estimated carcinogenic risk equal to or exceeding one in one million.

Health risk assessment modeling results will be summarized to include maximum annual (chronic, carcinogenic, and non-carcinogenic) and hourly (acute) adverse health effects from toxic air contaminant emissions. Cancer burden will be presented if the cancer risk is predicted to be greater than one in a million. Health risk values will be calculated and presented in the summary table for the points of maximum impact and the sensitive receptors with the maximum risk values.

6.3 CLASS I ANALYSIS

The results of the visibility, PSD and deposition analyses to evaluate the operational impacts of the EPP facility will be presented in summary tables and compared with all relevant significance thresholds.

6.4 DATA SUBMITTAL

Electronic copies of the modeling input and output files will be provided to SCAQMD and the CEC.

SECTION 7 REFERENCES

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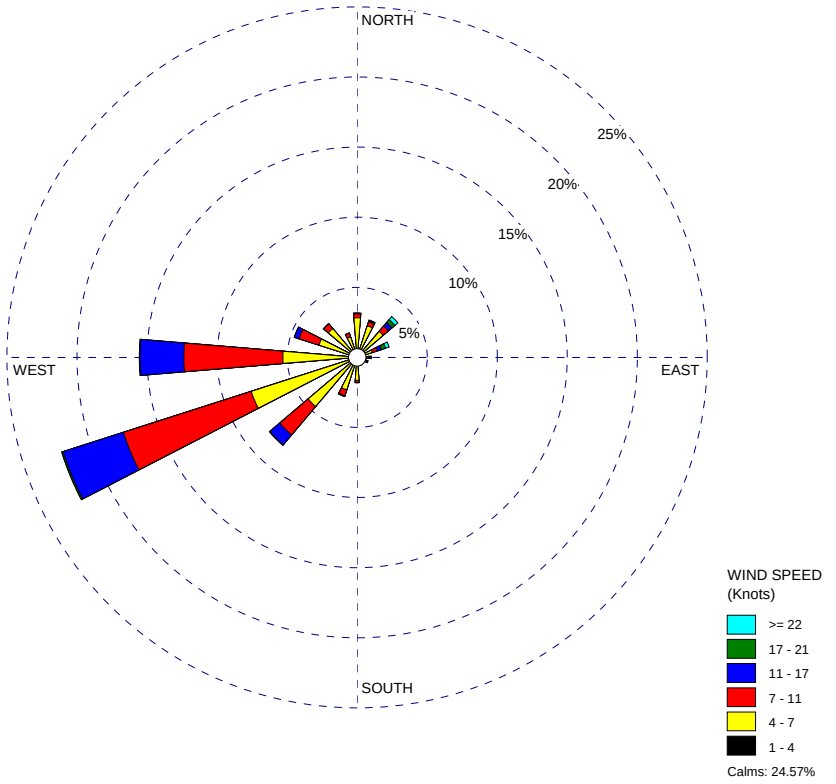
USDA Forest Service and National Park Service, 2005. CALPUFF Reviewer's Guide (DRAFT) prepared by Howard Gebhart. September 2005

APPENDIX A

Annual and Seasonal Windroses for the Ontario International Airport (1994, 95, 97, 98, and 99)

WIND ROSE PLOT:
Ontario International Airport

DISPLAY:
Wind Speed
Direction (blowing from)



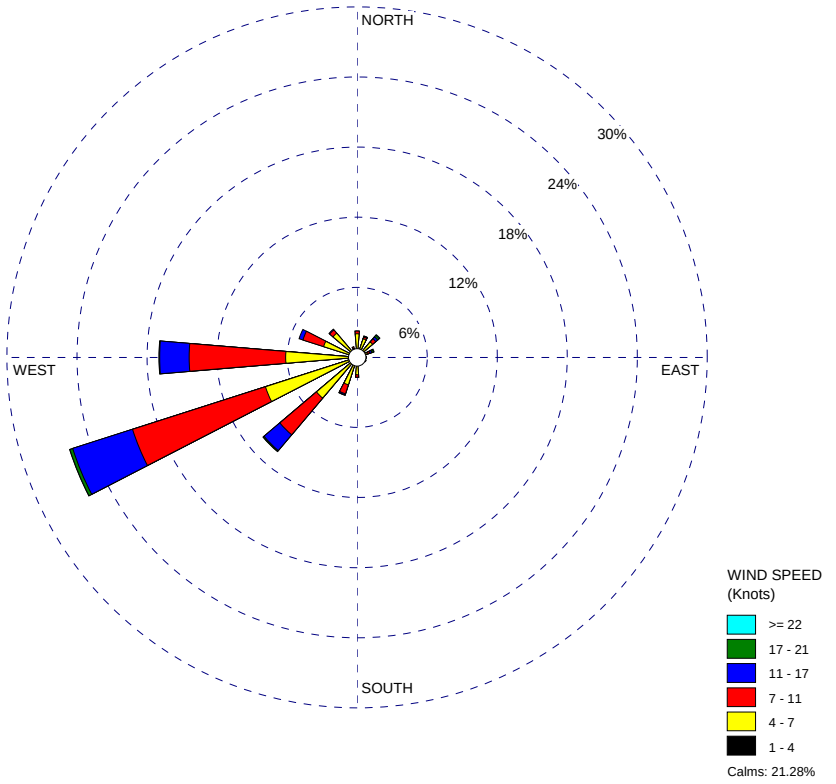
COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	1994 1995 1997 1998 1999 **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **24.57%**	TOTAL COUNT: **43800 hrs.**	
	AVG. WIND SPEED: **5.50 Knots**	DATE: **1/18/2007**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Annual Season Windrose for Ontario International Airport based on Surface Data for 1994, 1995, 1997, 1998 and 1999

WIND ROSE PLOT:
Ontario International Airport
1994-1999 Spring (Mar, Apr, May)

DISPLAY:
Wind Speed
Direction (blowing from)



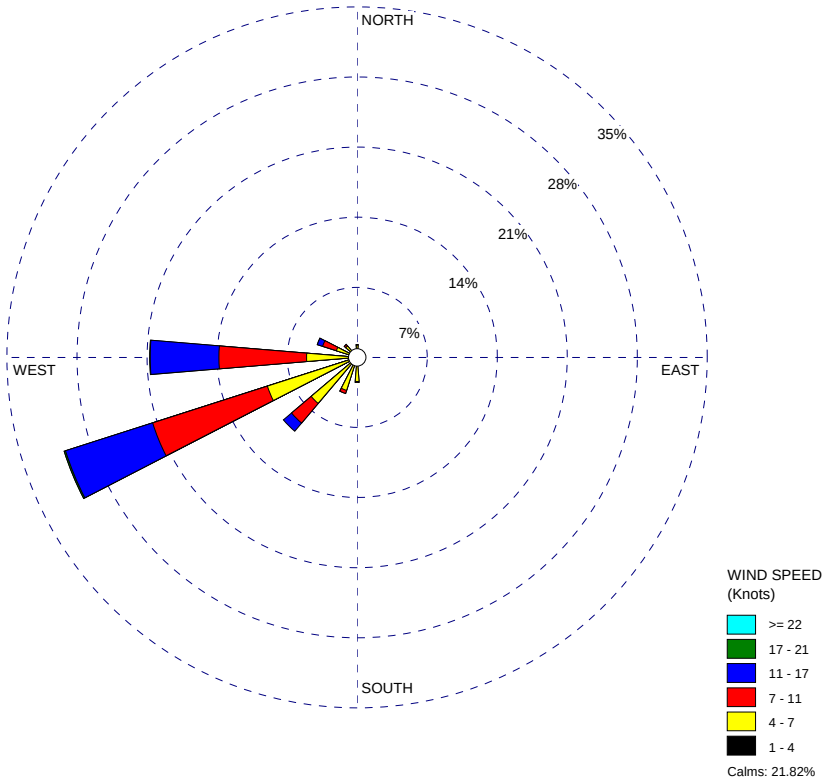
COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	1994 1995 1997 1998 1999 **Mar 1 - May 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **21.28%**	TOTAL COUNT: **11040 hrs.**	
	AVG. WIND SPEED: **5.82 Knots**	DATE: **1/18/2007**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Spring Season Windrose for Ontario International Airport based on Surface Data for 1994, 1995, 1997, 1998 and 1999

WIND ROSE PLOT:
Ontario International Airport
1994-1999 Summer (Jun, Jul, Aug)

DISPLAY:
Wind Speed
Direction (blowing from)



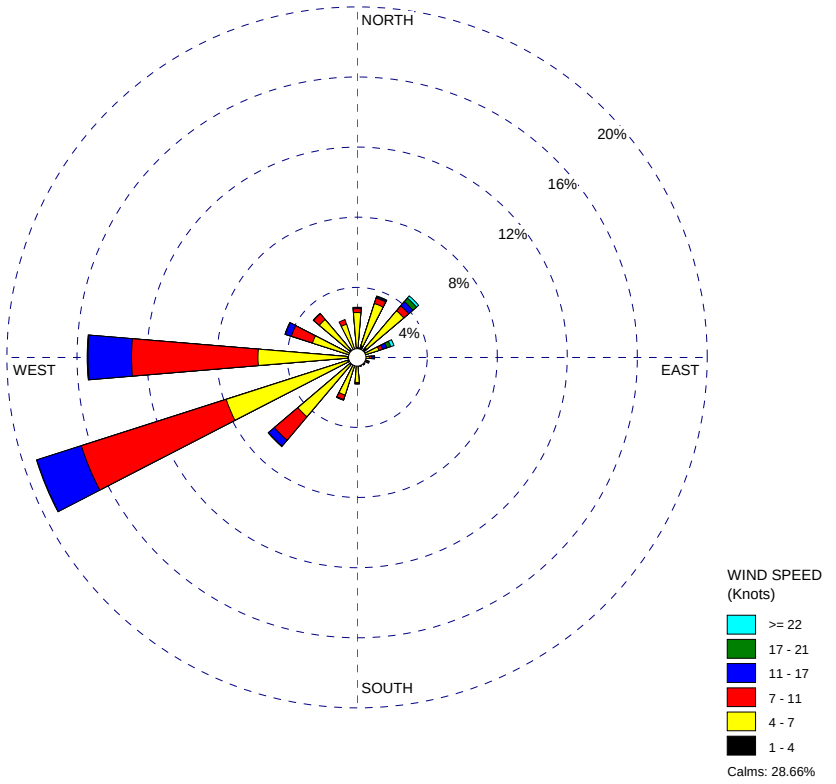
COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	1994 1995 1997 1998 1999 **Jun 1 - Aug 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **21.82%**	TOTAL COUNT: **11040 hrs.**	
	AVG. WIND SPEED: **6.08 Knots**	DATE: **1/18/2007**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Summer Season Windrose for Ontario International Airport based on Surface Data for 1994, 1995, 1997, 1998 and 1999

WIND ROSE PLOT:
Ontario International Airport
1994-1999 Fall (Sep, Oct, Nov)

DISPLAY:
Wind Speed
Direction (blowing from)



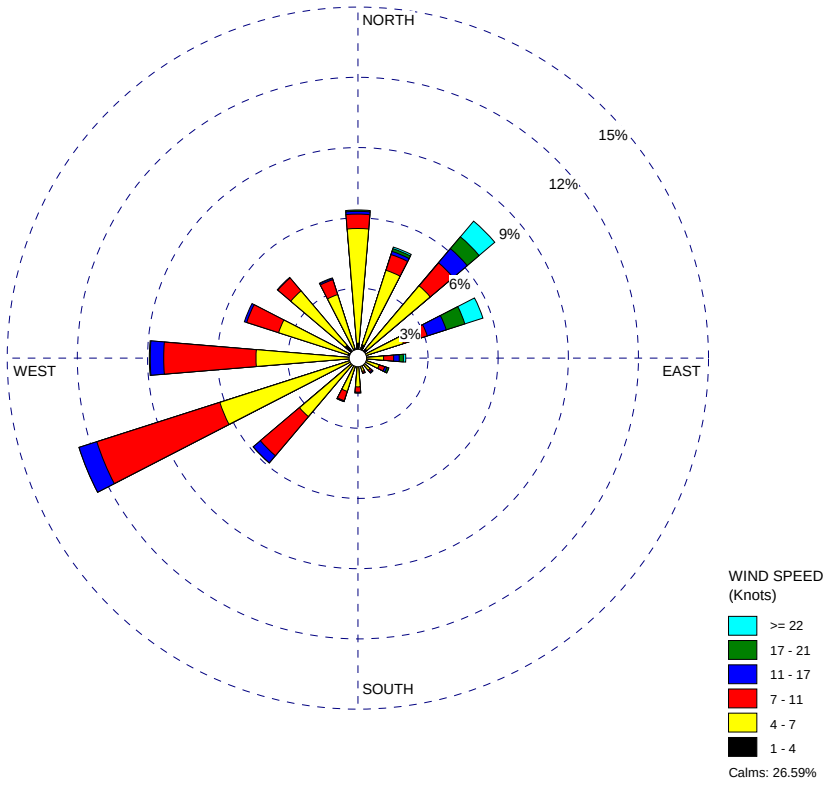
COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	1994 1995 1997 1998 1999 **Sep 1 - Nov 30** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **28.66%**	TOTAL COUNT: **10920 hrs.**	
	AVG. WIND SPEED: **4.84 Knots**	DATE: **1/18/2007**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Fall Season Windrose for Ontario International Airport based on Surface Data for 1994, 1995, 1997, 1998 and 1999

WIND ROSE PLOT:
Ontario International Airport
1994-1999 Winter (Jan, Feb, and Dec)

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	1994 1995 1997 1998 1999 **Check Date Range Report** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **26.59%**	TOTAL COUNT: **10800 hrs.**	
	AVG. WIND SPEED: **5.23 Knots**	DATE: **1/18/2007**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Winter Season Windrose for Ontario International Airport based on Surface Data for 1994, 1995, 1997, 1998 and 1999

Appendix K-6
VISCREEN Modeling Input

San Gabriel Generating Station Level II Visibility Modeling

VISCREEN LEVEL II MODELING SUMMARY

Background Visible Range: 213 km for Both Class I Areas
based on the average of the most recent years of the highest 20% worst background visual range for San Gabriel
Note this is the highest average background visual range from the nearest Class I areas ie San Gabriel, San Gorgonio, Joshua Tree and Agua Tibia
Ozone: 0.06 ppm

Class I Area	Wind Direction Range	Meteorological Data Years	Worst-case Stability Class	Worst-case Wind speed (m/s)	Distance to Class I Area Closest (km)	Distance to Class I Area Farthest (km)	Emission Scenario Max 1 hour	Modeled Parameter	VISCREEN Level II Results Inside Class I Area Sky 10	Sky 140	Ter 10	Ter 140	Threshold
Cucamonga	140 - 173	1994-1999	D	2	14	21	Normal	Delta E	0.500	0.282	1.559	0.062	2
							Operational	Contrast	0.009	-0.005	0.006	0	0.05
							Startup	Delta E	1.228	0.921	1.539	0.126	2
							Emissions	Contrast	0.005	-0.009	0.006	0.001	0.05
San Gabriel	111 - 135	1994-1999	D	2	36	49	Normal	Delta E	0.228	0.102	0.458	0.027	2
							Operational	Contrast	0.004	-0.002	0.003	0	0.05
							Startup	Delta E	0.490	0.337	0.444	0.076	2
							Emissions	Contrast	0.002	-0.004	0.003	0.000	0.05

San Gabriel Generating Station Level II Visibility Modeling
Class I Areas
Cucamonga Wilderness Area

Formulas:

σ_y and σ_z for urban areas are calculated from the parameters provided in Tables 1-3 and 1-4 in the ISC3 Volume II Users Guide.

BRIGGS FORMULAS USED TO CALCULATE McELROY-POOLER

σ_y (meters) $= a \times (1.0 + 0.0004\,x)^{-1/2}$

σ_z (meters) see below

x= 14.0 distance to class I area (km)

	Stability Class	a	notes	σ_y m	σ_z m	$\sigma_y\sigma_z u$ for various wind speeds (u=meters/second) 1	2	3	4	5	6	7	8
1	A	0.32	1	1743.838	13013.22	2.27E+07	4.54E+07	6.81E+07	9.08E+07	1.13E+08	1.36E+08	1.59E+08	1.82E+08
2	B	0.320	2	1743.838	13013.22	2.27E+07	4.54E+07	6.81E+07	9.08E+07	1.13E+08	1.36E+08	1.59E+08	1.82E+08
3	C	0.220	3	1198.888	2800	3.36E+06	6.71E+06	1.01E+07	1.34E+07	1.68E+07	2.01E+07	2.35E+07	2.69E+07
4	D	0.160	4	871.9188	859.5169	7.49E+05	1.50E+06	2.25E+06	3.00E+06	3.75E+06	4.50E+06	5.25E+06	6.00E+06
5	E	0.110	5	599.4442	238.7848	1.43E+05	2.86E+05	4.29E+05	5.73E+05	7.16E+05	8.59E+05	1.00E+06	1.15E+06
6	F	0.110	6	599.4442	238.7848	1.43E+05	2.86E+05	4.29E+05	5.73E+05	7.16E+05	8.59E+05	1.00E+06	1.15E+06
				Travel Time (hours)[7]		7.8	2.6	1.6	1.1	0.9	0.7	0.6	0.5

1 $0.24 \times (1.0 + 0.001\,x)^{1/2}$

2 $0.24 \times (1.0 + 0.001\,x)^{1/2}$

3 $0.20\,x$

4 $0.14 \times (1.0 + 0.0003\,x)^{-1/2}$

5 $0.08 \times (1.0 + 0.0015\,x)^{-1/2}$

6 $0.08 \times (1.0 + 0.0015\,x)^{-1/2}$

x = distance (meters)

Shaded areas represent wind speed/stability conditions not needed for this analysis.

(see page 45 in "Workbook for Plume Visual Impact Screening and Analysis, EPA-450/4-88-019; updated 10-92)

7 wind speed used to calculate travel time are the average ws within a ws category. (1-2 uses 1.5 m/s; ws category of 3-4 uses 3.5 m/s)

Condition No.	Meteorological Data: Stability Class	Meteorological Data: Wind Speed	$\sigma_y\sigma_z u$ m^3/s	Travel Time (hours)	Frequency of Occurance, Hour of day: 1-6	7-12	13-18	19-24	Percent Frequency of Occurance, Hour of day: 1-6 f	1-6 cf	7-12 f	7-12 cf	13-18 f	13-18 cf	19-24 f	19-24 cf	max f	max cf
1	F	0 - 1	1.43E+05	7.8	0	0	0	0	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
2	E	0 - 1	1.43E+05	7.8	0	0	0	0	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
3	F	1 - 2	2.86E+05	2.6	25	0	1	18	0.228%	0.228%	0.000%	0.000%	0.009%	0.009%	0.164%	0.164%	0.228%	0.228%
4	E	1 - 2	2.86E+05	2.6	4	2	1	3	0.037%	0.265%	0.018%	0.018%	0.009%	0.018%	0.027%	0.192%	0.037%	0.265%
5	F	2 - 3	4.29E+05	1.6	20	0	1	15	0.183%	0.447%	0.000%	0.018%	0.009%	0.027%	0.137%	0.329%	0.183%	0.447%
6	E	2 - 3	4.29E+05	1.6	14	4	3	14	0.128%	0.575%	0.037%	0.055%	0.027%	0.055%	0.128%	0.457%	0.128%	0.575%
7	E	3 - 4	5.73E+05	1.1	0	0	2	2	0.000%	0.575%	0.000%	0.055%	0.018%	0.073%	0.018%	0.475%	0.018%	0.594%
8	E	4 - 5	7.16E+05	0.9	0	0	0	0	0.000%	0.575%	0.000%	0.055%	0.000%	0.073%	0.000%	0.475%	0.000%	0.594%
9	D	0 - 1	7.49E+05	7.8	0	0	0	0	0.000%	0.575%	0.000%	0.055%	0.000%	0.073%	0.000%	0.475%	0.000%	0.594%
10	D	1 - 2	1.50E+06	2.6	3	16	1	0	0.027%	0.603%	0.146%	0.201%	0.009%	0.082%	0.000%	0.475%	0.146%	0.740%
11	D	2 - 3	2.25E+06	1.6	14	60	11	8	0.128%	0.731%	0.548%	0.749%	0.100%	0.183%	0.073%	0.548%	0.548%	1.288%
12	D	3 - 4	3.00E+06	1.1	2	14	6	1	0.018%	0.749%	0.128%	0.877%	0.055%	0.237%	0.009%	0.557%	0.128%	1.416%
13	D	4 - 5	3.75E+06	0.9	1	0	2	0	0.009%	0.758%	0.000%	0.877%	0.018%	0.256%	0.000%	0.557%	0.018%	1.434%
14	D	5 - 6	4.50E+06	1.1	0	2	1	0	0.000%	0.758%	0.018%	0.895%	0.009%	0.265%	0.000%	0.557%	0.018%	1.452%
15	D	6 - 7	5.25E+06	0.6	0	0	2	1	0.000%	0.758%	0.000%	0.895%	0.018%	0.283%	0.009%	0.566%	0.018%	1.470%
16	D	7 - 8	6.00E+06	0.5	0	1	1	0	0.000%	0.758%	0.009%	0.904%	0.009%	0.292%	0.000%	0.566%	0.009%	1.479%
Total hours of all meteorological data =				43800														
Total hours of met data by time of day					10950	10950	10950	10950										

Note no wind direction was associated with calm winds (0 m/s wind speed), thus there are 0 hours with wind speeds between 0-1 m/s for all stability classes

San Gabriel Generating Station Level II Visibility Modeling
Class I Areas
San Gabriel Wilderness Area

Formulas:

σ_y and σ_z for urban areas are calculated from the parameters provided in Tables 1-3 and 1-4 in the ISC3 Volume II Users Guide.

BRIGGS FORMULAS USED TO CALCULATE McELROY-POOLER

σ_y (meters) $= a \times (1.0 + 0.0004\,x)^{-1/2}$

σ_z (meters) see below

x= 36.0 distance to class I area (km)

	Stability Class	a	notes	σ_y m	σ_z m	$\sigma_y\sigma_z u$ for various wind speeds (u=meters/second) 1	2	3	4	5	6	7	8
1	A	0.32	1	2935.568	52555.07	1.54E+08	3.09E+08	4.63E+08	6.17E+08	7.71E+08	9.26E+08	1.08E+09	1.23E+09
2	B	0.320	2	2935.568	52555.07	1.54E+08	3.09E+08	4.63E+08	6.17E+08	7.71E+08	9.26E+08	1.08E+09	1.23E+09
3	C	0.220	3	2018.203	7200	1.45E+07	2.91E+07	4.36E+07	5.81E+07	7.27E+07	8.72E+07	1.02E+08	1.16E+08
4	D	0.160	4	1467.784	1467.201	2.15E+06	4.31E+06	6.46E+06	8.61E+06	1.08E+07	1.29E+07	1.51E+07	1.72E+07
5	E	0.110	5	1009.101	388.3391	3.92E+05	7.84E+05	1.18E+06	1.57E+06	1.96E+06	2.35E+06	2.74E+06	3.13E+06
6	F	0.110	6	1009.101	388.3391	3.92E+05	7.84E+05	1.18E+06	1.57E+06	1.96E+06	2.35E+06	2.74E+06	3.13E+06
				Travel Time (hours)[7]		20.0	6.7	4.0	2.9	2.2	1.8	1.5	1.3

1 $0.24 \times (1.0 + 0.001\,x)^{1/2}$

2 $0.24 \times (1.0 + 0.001\,x)^{1/2}$

3 $0.20\,x$

4 $0.14 \times (1.0 + 0.0003\,x)^{-1/2}$

5 $0.08 \times (1.0 + 0.0015\,x)^{-1/2}$

6 $0.08 \times (1.0 + 0.0015\,x)^{-1/2}$

x = distance (meters)

Shaded areas represent wind speed/stability conditions not needed for this analysis.

(see page 45 in "Workbook for Plume Visual Impact Screening and Analysis, EPA-450/4-88-019; updated 10-92)

7 wind speed used to calculate travel time are the average ws within a ws category. (1-2 uses 1.5 m/s; ws category of 3-4 uses 3.5 m/s)

Condition No.	Meteorological Data: Stability Class	Wind Speed	$\sigma_y\sigma_z u$ m^3/s	Travel Time (hours)	Frequency of Occurance, Hour of day: 1-6	7-12	13-18	19-24	Percent Frequency of Occurance, Hour of day: 1-6 f	1-6 cf	7-12 f	7-12 cf	13-18 f	13-18 cf	19-24 f	19-24 cf	max f	max cf
1	F	0 - 1	3.92E+05	20.0	0	0	0	0	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
2	E	0 - 1	3.92E+05	20.0	0	0	0	0	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
3	F	1 - 2	7.84E+05	6.7	12	0	0	6	0.110%	0.110%	0.000%	0.000%	0.000%	0.000%	0.055%	0.055%	0.110%	0.110%
4	E	1 - 2	7.84E+05	6.7	1	3	0	0	0.009%	0.119%	0.027%	0.027%	0.000%	0.000%	0.000%	0.055%	0.027%	0.137%
5	F	2 - 3	1.18E+06	4.0	14	0	2	22	0.128%	0.247%	0.000%	0.027%	0.018%	0.018%	0.201%	0.256%	0.201%	0.338%
6	E	2 - 3	1.18E+06	4.0	17	4	2	13	0.155%	0.402%	0.037%	0.064%	0.018%	0.037%	0.119%	0.374%	0.155%	0.493%
7	E	3 - 4	1.57E+06	2.9	0	0	0	3	0.000%	0.402%	0.000%	0.064%	0.000%	0.037%	0.027%	0.402%	0.027%	0.521%
8	E	4 - 5	1.96E+06	2.2	1	0	0	1	0.009%	0.411%	0.000%	0.064%	0.000%	0.037%	0.009%	0.411%	0.009%	0.530%
9	D	0 - 1	2.15E+06	20.0	0	0	0	0	0.000%	0.411%	0.000%	0.064%	0.000%	0.037%	0.000%	0.411%	0.000%	0.530%
10	D	1 - 2	4.31E+06	6.7	5	9	1	0	0.046%	0.457%	0.082%	0.146%	0.009%	0.046%	0.000%	0.411%	0.082%	0.612%
11	D	2 - 3	6.46E+06	4.0	5	49	10	5	0.046%	0.502%	0.447%	0.594%	0.091%	0.137%	0.046%	0.457%	0.447%	1.059%
12	D	3 - 4	8.61E+06	2.9	5	16	3	3	0.046%	0.548%	0.146%	0.740%	0.027%	0.164%	0.027%	0.484%	0.146%	1.205%
13	D	4 - 5	1.08E+07	2.2	1	5	4	1	0.009%	0.557%	0.046%	0.785%	0.037%	0.201%	0.009%	0.493%	0.046%	1.251%
14	D	5 - 6	1.29E+07	2.9	1	2	5	3	0.009%	0.566%	0.018%	0.804%	0.046%	0.247%	0.027%	0.521%	0.046%	1.297%
15	D	6 - 7	1.51E+07	1.5	0	1	1	0	0.000%	0.566%	0.009%	0.813%	0.009%	0.256%	0.000%	0.521%	0.009%	1.306%
16	D	7 - 8	1.72E+07	1.3	0	1	3	1	0.000%	0.566%	0.009%	0.822%	0.027%	0.283%	0.009%	0.530%	0.027%	1.333%
	Total hours of all meteorological data =			43800														
		Total hours of met data by time of day			10950	10950	10950	10950										

Note no wind direction was associated with calm winds (0 m/s wind speed), thus there are 0 hours with wind speeds between 0-1 m/s for all stability classes

Appendix K-7
BACT Analysis

The BACT assessment conducted for the Project considered all emission control technologies currently proposed or in use on natural-gas-fired combustion turbines (>50 MMBtu/hour heat input) in combined cycle configurations, as well as gas-fired boilers. To identify feasible emission limits, several information sources were consulted, including the following:

- U.S. EPA BACT/Lowest Achievable Emission Rate Clearinghouse (U.S. EPA 1985) and updates
- CARB BACT Clearinghouse database and CARB BACT Guidelines for Power Plants (Adopted 7/22/99)
- Recent California Energy Commission (CEC) Applications for Certification
- Research conducted by SGGS design engineers

Table 1 lists selected recent NO_x BACT determinations for natural-gas-fired **c**ombined cycle power projects in California using advanced technology combustion turbines. BACT for the most recent projects that have come on line in the state has been determined to be either 2.0 or 2.5 ppm NO_x by volume (ppmvd) (at 15 percent oxygen [O_2]), to be achieved by means of SCR with ammonia injection. The most recent projects to be approved by CEC committed to a NO_x BACT level of 2.0 ppmvd at 15% O_2. The CTG in this Project will achieve the BACT concentration of 2.0 ppmvd at 15 percent O_2 using dry low-NOx combustor technology (rather than steam or water injection, as a means of water conservation), and SCR.

Similarly, the most recent combined cycle turbine projects have been approved with a CO emissions limit between 3 and 6 ppmvd and a ROC emissions limit at or near 2 ppmvd (both at 15 percent O_2), based on the use of an oxidation catalyst. The CTG in this Project will employ the same control technology to achieve comparable CO and ROC stack exhaust levels. Exclusive use of natural gas fuel has been determined to be BACT for SO_x and PM_{10} in all other comparable projects for several years.

1 COMBINED CYCLE GAS TURBINE CONTROL TECHNOLOGIES

1.1 ASSESSMENT OF NO_x CONTROL TECHNOLOGIES

Based on a review of materials described above, the following NO_x control technologies were evaluated to determine whether they are able to achieve BACT NO_x levels in practice:

- Dry low-NOx burners (DLN) and Goal Line SCONOx™
- DLN and SCR with ammonia injection

SCONOx™

SCONOx™ is a NO_x reduction system produced by Goal Line Environmental Technologies (now distributed by EmeraChem) for gas turbine applications. This system uses a coated catalyst to oxidize both NO_x and CO, thereby reducing plant emissions of these pollutants. CO emissions are reduced in SCONOx™ by the oxidation of CO to CO_2. A two-step process reduces the NO_x emissions. First, NO_x emissions are oxidized to NO_2 and then adsorbed onto the catalyst. In the second step, a proprietary regenerative gas is passed through the catalyst periodically. This gas

de-sorbs the NO_2 from the catalyst and reduces it to N_2. The system does not use ammonia as a reagent; rather, it uses natural gas as the basis for a proprietary catalyst regeneration process.

TABLE 1
SUMMARY OF RECENT NO_X BACT DETERMINATIONS
FOR COMBUSTION TURBINE GENERATORS IN COMBINED CYCLE CONFIGURATIONS

Name	Location	Emission Limit[1]			Control(s)	On-Line Date
		NOx	CO	ROC		
Projects Recently Coming On-Line						
PICO	CA	2.0 ppm	4.0 ppm	2 ppm	SCR with ammonia CO Catalyst	March 05
Metcalf	CA	2.5 ppm	6.0 ppm	2 ppm	SCR with ammonia CO Catalyst	May 05
Pastoria – Phase 1	CA	2.5 ppm	3.0 ppm	6 ppm	SCR with ammonia CO Catalyst	July 05
Magnolia	CA	2.0 ppm	2.0 ppm	2 ppm	SCR with ammonia CO Catalyst	September 05
Malburg	CA	2.0 ppm	2.0 ppm	2 ppm	SCR with ammonia CO Catalyst	October 05

Name	Location	NOx	CO	ROC	Control(s)	Date Permitted
Projects Recently Permitted by CEC						
East Altamont	CA	2.0 ppm	6.0 ppm	2.0 ppm	SCR with ammonia CO Catalyst	
SMUD Consumnes	CA	2.0 ppm	4.0 ppm	1.4 ppm	SCR with ammonia CO Catalyst	
Inland Empire	CA	2.0 ppm	3.0 ppm	2.0 ppm	SCR with ammonia CO Catalyst	
San Joaquin	CA	2.0 ppm	4.0 ppm	2.0 ppm	SCR with ammonia CO Catalyst	
Roseville	CA	2.0 ppm	4.0 ppm	2.0 ppm	SCR with ammonia CO Catalyst	

[1] All emission limits are in ppm by volume referenced to 15% O_2

SCR = selective catalytic reduction

As demonstrated by an initial installation on several gas turbines where energy is recovered from the exhaust gas to produce steam, SCONOx™ is capable of achieving NO_x emission concentrations of 2 ppm based on a maximum inlet concentration of 25 ppm, and 90 percent CO reduction based on a maximum inlet concentration of 50 ppm. However, the effectiveness of the SCONOx™ technology has not been demonstrated on turbines as large as the Siemens 5000F turbines proposed for the SGGS Project.

Vendors of the SCONOx™ technology have stated that it is commercially ready for any size turbine. However, the largest turbine that SCONOx™ has actually been applied to thus far is a GE LM2500, approximately 25 MW in capacity, or about 10% the capacity of the proposed project. The Otay Mesa Power Project (which would have used Frame 7F turbines in a combined cycle configuration) was permitted with a commitment to use the SCONOx™ technology as the primary NO_x and CO control method if possible, but construction of that project has been postponed for several years. The AFC filed in 2000 for the Nueva Azalea Project also proposed to use the SCONOx™ technology, but this project was ultimately never built.
SCONOx™ would not require an oxidizing catalyst or the use of ammonia reagent to control CO and NO_x emissions. The SCONOx™ technology employs a reactive catalyst that must be regenerated on a regular basis. The catalyst reacts with CO and NO to form CO_2, which is emitted, and NO_2, which is absorbed on the surface of the catalyst until it is saturated. Prior to saturation, the catalyst is regenerated. This is accomplished by sealing off the catalyst from the exhaust stream by means of a pair of mechanical louver doors and subjecting it to a mixture of natural gas and steam that forms hydrogen to produce elemental nitrogen and CO_2, which are emitted through the stack.

The manufacturer of SCONOx™ recommends that the catalyst in each module be removed and put through a regenerative bathing process once a year. An on-line catalyst washing system design has not yet been fully developed. There is some concern that the bathing process may result in an additional hazardous waste stream. The time required for this process is not clearly known, but it is likely to be approximately 1-2 weeks. Also, there may be a requirement that liquefied natural gas be stored on-site for use during the regular regeneration process of the catalyst throughout the year.

For large gas turbines, an assembly of multiple SCONOx™ modules would be required to control NO_x and CO to 2 ppm each. For example, proposals for installation of the technology on Frame 7F turbine have specified up to 15 such modules, with a capital cost of $26 million (Three Mountain Power Plant, 99-AFC-2). Testing has not yet been conducted to demonstrate the successful operation of the louver doors used by each module under realistic flow and emissions conditions that would be found in large turbines. Also, control algorithms have not yet been developed nor tested for controlling large numbers of SCONOx™ modules. Due to the lack of appropriate testing and information, some HRSG manufacturers have expressed reluctance to issue guarantees for their equipment if SCONOx™ is installed (Beck, 2000).

Although the SCONOx™ technology has been demonstrated to be an effective NO_x and CO emission abatement system on a few small combined cycle turbine installations and does not require the use of ammonia reagent, an SCR system has virtually the same NO_x emissions

guarantee as the SCONOx™ at a much lower price, and has been successfully demonstrated extensively on large Frame-type turbines.

Potential advantages of the SCONOx™ process include:

- **No ammonia.** The SCONOx™ process does not use ammonia. This eliminates the ammonia storage and transportation safety issues entirely and the potential for ammonia slip or ammonia-based particulate formation.
- **Carbon monoxide reduction.** SCONOx™ will reduce CO emissions as well as NO_x emissions.

Potential disadvantages of the SCONOx™ process include:

- **Unproven for large gas turbines.** While demonstrated to be effective on smaller turbines, several aspects of the technology have not been demonstrated for a system configured for a larger turbine.
- **Catalyst "washing."** A proprietary catalyst washing system must be used and an on-line catalyst washing system design has not yet been fully developed. If an on-line catalyst washing system is not used, then the facility must be shut down for cleaning.
- **High capital and operating cost.** SCONOx™ is significantly more expensive than SCR with ammonia injection, primarily due to the higher cost of initial and replacement catalyst. The SCONOx™ catalyst is a precious metal catalyst, which is very expensive.

Because the performance of SCONOx™ has not been sufficiently demonstrated as "achieved in practice" on large combined cycle turbines, as discussed above, SCONOx™ does not represent BACT for the SGGS Project at this time.

SCR with Ammonia Injection

SCR with ammonia injection systems for reduction of NO_x emissions have been widely used in combined cycle gas turbine applications for many years and are considered a proven technology. In fact, all combined cycle projects utilizing frame-size gas turbines that have been permitted and constructed in California in the last ten years have utilized SCR in combination with either water injection or dry low-NO_x burners.

SCR systems are commercially available from several vendors, unlike SCONOx™, which is available from a single vendor. The SCR process involves the injection of ammonia into the flue gas stream via an ammonia injection grid upstream of a catalyst. The ammonia reacts with the NO_x gases in the presence of the catalyst. The catalyst is not regenerated and requires periodic replacement. SCR vendors typically offer a 3-year guarantee on catalyst life. SCR with ammonia injection systems have been used in numerous larger combined cycle applications including Siemens 5000F Class units.

The Project will use dry low-NOx burners (DLN) and SCR with ammonia injection designed to achieve a NO_x emission limit of 2.0 ppm (at 15 percent O_2) on a 3-hour average. As noted in Table 1, this level of NO_x control is consistent with other recent similar projects, and is considered to be BACT for the SGGS Project. It has also been approved by the SCAQMD on other similar projects.

OTHER TECHNOLOGIES

Technologies that cannot achieve a NO_x emissions limit of 2.0 ppmvd (at 15 percent O_2) in practice were not considered as potential BACT candidates. These technologies include SCR without DLN and DLN without SCR.

1.2 ASSESSMENT OF CO CONTROL TECHNOLOGIES

The SGGS CTG is guaranteed to achieve 2 ppm (at 15 percent O_2) over a 3-hour average with natural gas fuel and use of a CO oxidation catalyst (except during unit startup and shutdown). The use of a CO oxidation catalyst will result in emissions of CO that will conform to current SCAQMD BACT requirements.

The following CO control technologies are evaluated:

- Combustion design/control
- Oxidizing catalyst

Combustion Design/Control

Gas turbine combustion technology has significantly improved over recent years with respect to lowering CO emissions. This turbine design that will be used for the SGGS Project has been guaranteed by the manufacturer to achieve a CO rate of 2.0 ppm (at 15 percent O_2) with post-combustion control technologies under a wide range of operating conditions (60 percent to 100 percent load) and ambient conditions (15°F to 115°F).

Oxidizing Catalyst

CO oxidizing catalysts have been used with natural-gas-fired turbines for over a decade when uncontrolled CO emission levels are considered unacceptably high. CO catalysts operate at elevated temperatures within the exhaust stream and are considered technically feasible, having been successfully demonstrated in numerous combined cycle Frame turbine applications. Thus, installation of a CO oxidizing catalyst on the Project turbines is considered to be BACT for CO in the case of the SGGS application.

1.3 ASSESSMENT OF ROC CONTROL TECHNOLOGIES

The proposed BACT level of 2 ppmvd (at 15 percent O_2) for ROC control achieved by an oxidation catalyst is consistent with the most stringent level that has been demonstrated in practice by the latest combined cycle units to come on line in California and is therefore considered to be BACT for the SGGS Project.

1.4 ASSESSMENT OF SO_2 AND PM_{10} CONTROL TECHNOLOGIES

Sulfur dioxide and PM_{10} emissions will be controlled through the exclusive use of clean-burning pipeline quality natural gas. This control technology has been widely and uniformly implemented for control of SO_2 and PM_{10} emissions from combustion turbines in California and throughout the United States, and is considered to be BACT for the SGGS Project.

1.5 ASSESSMENT OF AMMONIA SLIP CONTROL TECHNOLOGIES

The proposed BACT level of 5 ppmvd NH_3 (at 15 percent O_2) is the most rigorous control requirement that has been imposed to date on any gas turbine power plant project in California, and is thus considered to represent an appropriate BACT level for the SGGS Project.

2 AUXILIARY BOILER CONTROL TECHNOLOGIES

The Project will include a 56 MMBTU auxiliary boiler. Several recent BACT determinations for similar boilers are presented on the SCAQMD website. In reviewing these determinations, the NOx emission limit for recent boilers under 100 MMBTUvaries from 7 to 12 ppm @ 3% O2. The table below presents the BACT determination from several recent applications in the SCAQMD. Low NOx burners will be used for emission control on the auxiliary boiler to control NOx emissions to 9 ppm @ 3% O2. CO will be controlled to 50 ppm @ 3% 02. BACT was not specified for VOC, SO_x, and PM_{10} for natural gas boilers of similar size, but good combustion control and use of natural gas is commonly accepted as BACT for a unit of this size and type.

Location	Application Date	Boiler Rating (MM BTU/Hr)	Control Technology	Emission Limit (ppm) VOC	CO	NOx
Los Angeles, CA	5/19/04	39	Ultra low NOx burners with FGR	3	100	9
Fullerton, CA	7/11/03	10	Ultra low NOx burners with forced internal recirculation (FIR)		50	12
City of Industry, CA	4/15/03	21	SCR		50	7
Chatsworth, CA	11/22/02	21.5	Ultra low NOx burners		100	9
Fremont, CA	6/8/01	28.8	Low NOx burners		50	9

Emissions corrected to 3% O2

Appendix K-8
South Coast Air Quality Management District
Letter of Completeness

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 · www.aqmd.gov

May 17, 2007

Robert W. Lawhn
Director, Environmental Compliance
San Gabriel Power Generation, LLC
7251 Amigo Street, Suite 120
Las Vegas, NV 89119

Subject: San Gabriel Generating Station project, AQMD ID# 115615
8996 Etiwanda Ave, Etiwanda, CA 91739

Dear Mr. Lawhn:

The South Coast Air Quality Management District (AQMD) received permit applications for the above project on May 1, 2007. AQMD has conducted an initial review of the information submitted and made a determination that the application package is complete. The reference application numbers for this project and our initial review determination are provided in the table below:

Application	Equipment Description	Completeness Determination
468530	Siemens 5000 F Gas Turbine #1	Deemed Complete
468531	SCR/CO Catalyst #1	Deemed Complete
468533	Siemens 5000 F Gas Turbine #2	Deemed Complete
468534	SCR/CO Catalyst #2	Deemed Complete
466535	Auxiliary Boiler	Deemed Complete
468536	Ammonia Storage Tank	Deemed Complete
468529	Title V Revision	Deemed Complete

Please be aware that additional information will be needed during the course of our full engineering evaluation. Your cooperation is key to the timely review of the applications. The following issues have been identified during the completeness review:

- SCR and CO catalyst vendor guarantees – AQMD requires that the control system vendors provide their guarantees for emission rates and catalyst life. SGGS has indicated that the vendor guarantees are not available at this time, but will be available in approximately 45 days. Therefore, these guarantees must be submitted to AQMD no later than June 29, 2007 in order for AQMD to process your applications in a timely manner.

- Offsets – The application indicates that the facility intends to acquire offsets from the AQMD's priority reserve, subject to AQMD's rule amendment and approval. Please be aware, that as a prerequisite to accessing the priority reserve, the facility shall conduct due diligence efforts to secure available ERCs from the open market. The facility needs

to acquire sufficient offset credits for SOx, CO[1], PM10 and VOC before a final permit is issued. Additionally, the facility needs to demonstrate that it holds sufficient NOx RECLAIM credits before the project commences operation.

The following table shows an estimate of emissions from the project that need to be offset (note that when ERCs or Priority Reserve credits are used as the offset source the estimated emissions will need to include a 1.2 offset factor).

Pollutant	Amount	Source
NOx	269,000 lbs/yr	RTCs
CO[1]	3,438 lbs/day	Priority Reserve per Rule 1309.1 or ERCs
VOC	340 lbs/day	ERC
PM10	804 lbs/day	Priority Reserve per Rule 1309.1 or ERCs
SOx	71 lbs/day	Priority Reserve per Rule 1309.1 or ERCs

If you have any questions regarding your permit applications please contact Mr. Chris Perri at (909) 396-2696 or cperri@aqmd.gov.

Sincerely,

Michael D. Mills

Michael D. Mills, P.E
Senior Manager
General Commercial & Energy Team
Engineering & Compliance

MM:JTY:CGP

Cc: Mohsen Nazemi
Joe Lawyer, CEC

[1] CO offsets may not be required due to the recent re-designation of the South Coast Basin to attainment for CO