DOCKETED

Docket Number:	15-AFC-01
Project Title:	Puente Power Project
TN #:	204220-3
Document Title:	Appendix C Air Quality
Description:	AFC Volume II
Filer:	Sabrina Savala
Organization:	NRG Oxnard Energy Center, LLC
Submitter Role:	Applicant
Submission Date:	4/16/2015 11:22:10 AM
Docketed Date:	4/15/2015

APPENDIX C

AIR QUALITY

APPENDIX C-1

WIND ROSES

Composite Quarterly and Annual Wind Roses for Oxnard, CA 2009 – 2013

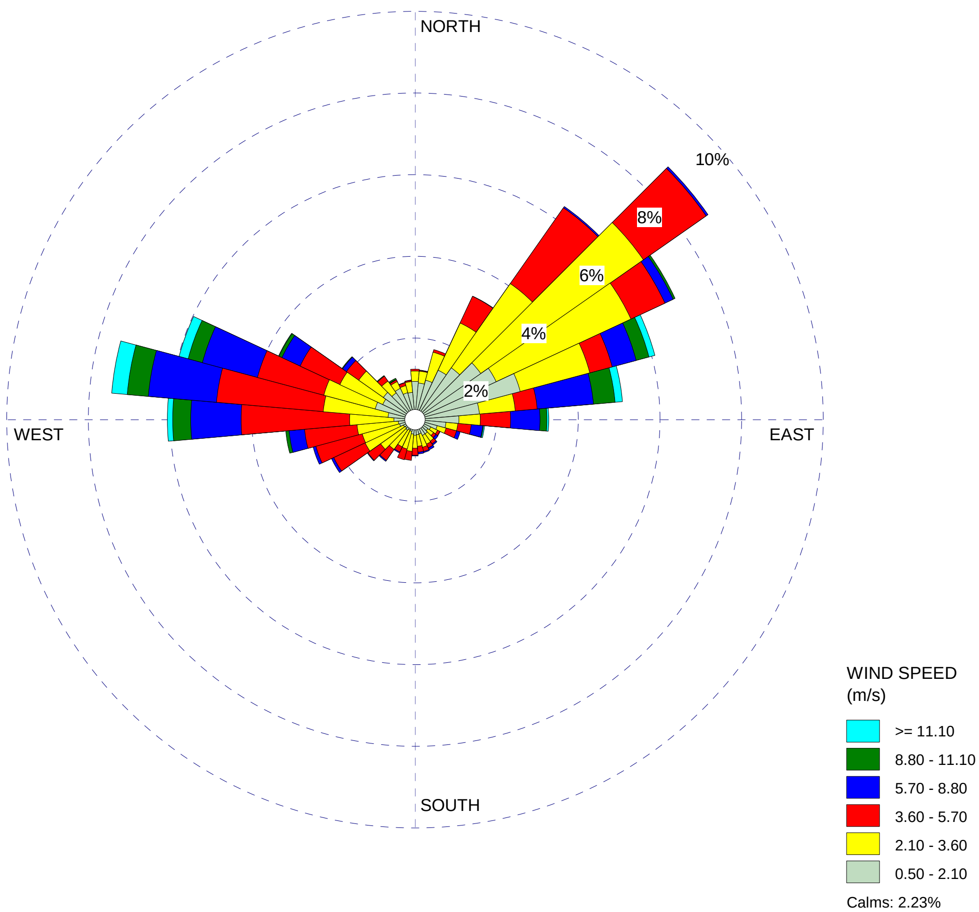
First Quarter, 2009 – 2013

WIND ROSE PLOT:

Oxnard, CA, 2009-2013
First Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 1/1/2009 - 00:00
End Date: 3/31/2013 - 23:00

COMPANY NAME:

MODELER:

CALM WINDS:

2.23%

TOTAL COUNT:

10784 hrs.

AVG. WIND SPEED:

3.41 m/s

DATE:

1/6/2015

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

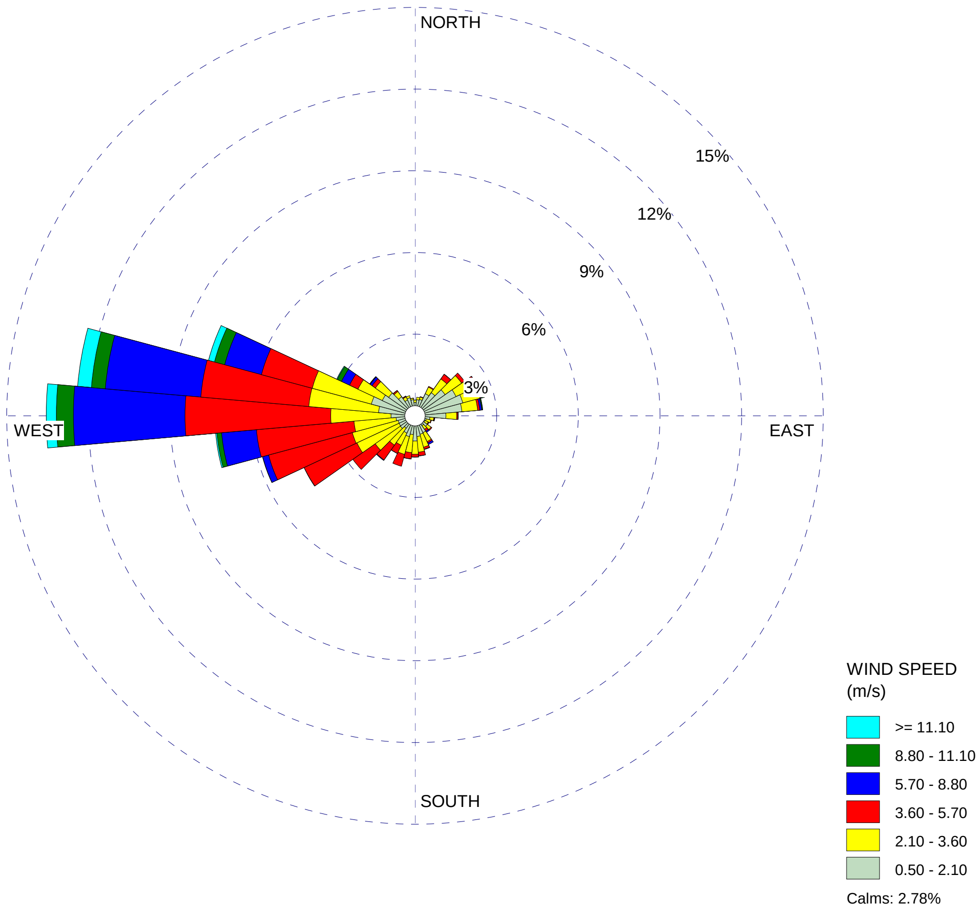
Second Quarter, 2009 – 2013

WIND ROSE PLOT:

Oxnard, CA, 2009-2013
Second Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 4/1/2009 - 00:00
End Date: 6/30/2013 - 23:00

COMPANY NAME:

MODELER:

CALM WINDS:

2.78%

TOTAL COUNT:

10878 hrs.

AVG. WIND SPEED:

3.43 m/s

DATE:

1/6/2015

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

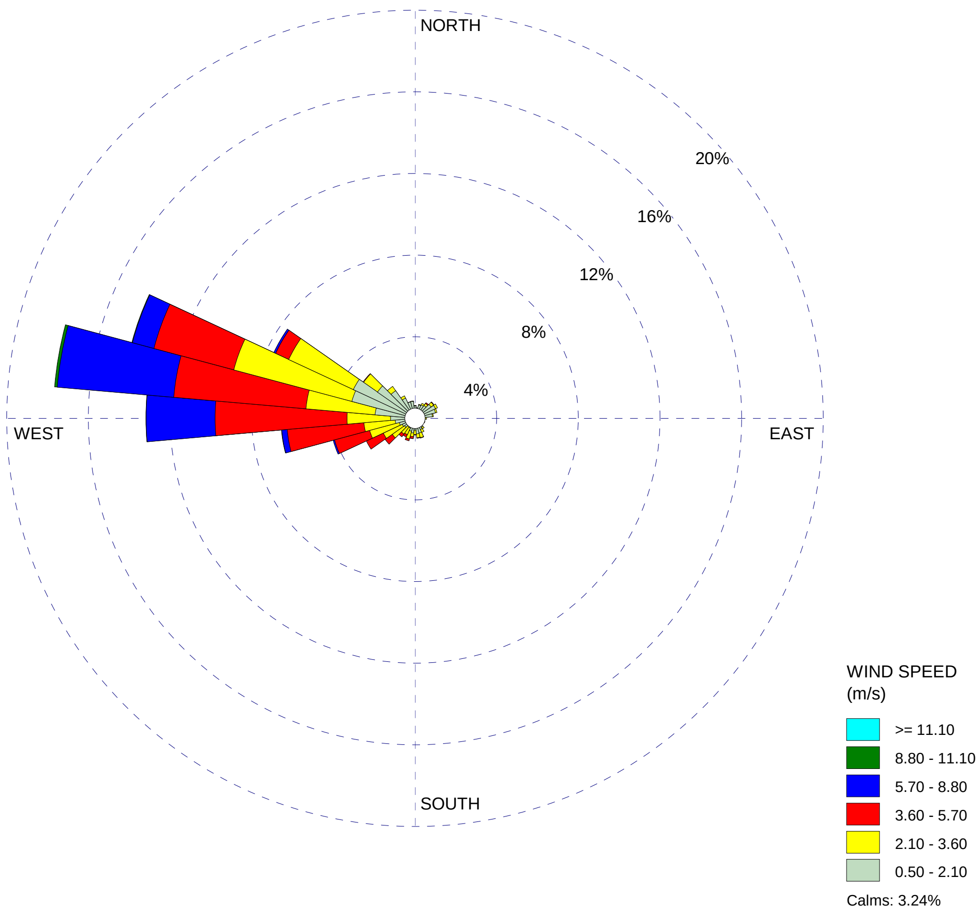
Third Quarter, 2009 – 2013

WIND ROSE PLOT:

Oxnard, CA, 2009-2013
Third Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 7/1/2009 - 00:00 **End Date: 9/30/2013 - 23:00**	MODELER:	
	CALM WINDS: **3.24%**	TOTAL COUNT: **10939 hrs.**	
	AVG. WIND SPEED: **3.08 m/s**	DATE: **1/6/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

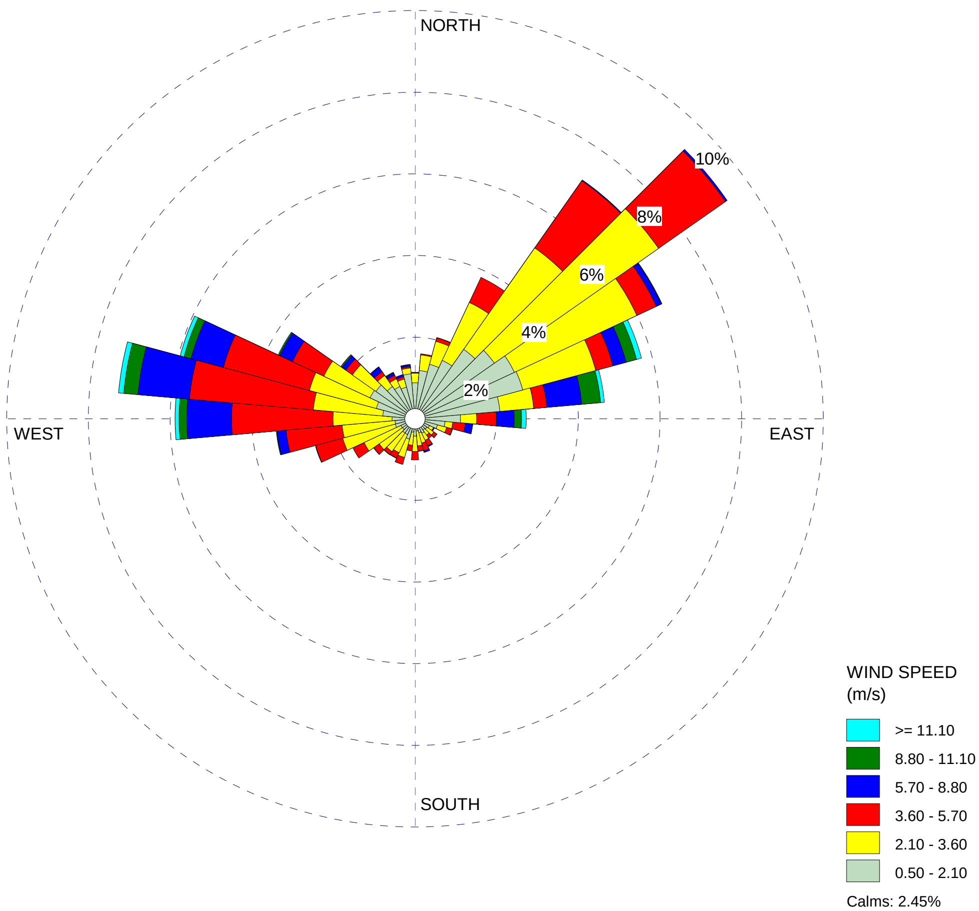
Fourth Quarter, 2009 – 2013

WIND ROSE PLOT:

Oxnard, CA, 2009-2013
Fourth Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 10/1/2009 - 00:00
End Date: 12/31/2013 - 16:00

COMPANY NAME:

MODELER:

CALM WINDS:

2.45%

TOTAL COUNT:

10998 hrs.

AVG. WIND SPEED:

3.05 m/s

DATE:

1/6/2015

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

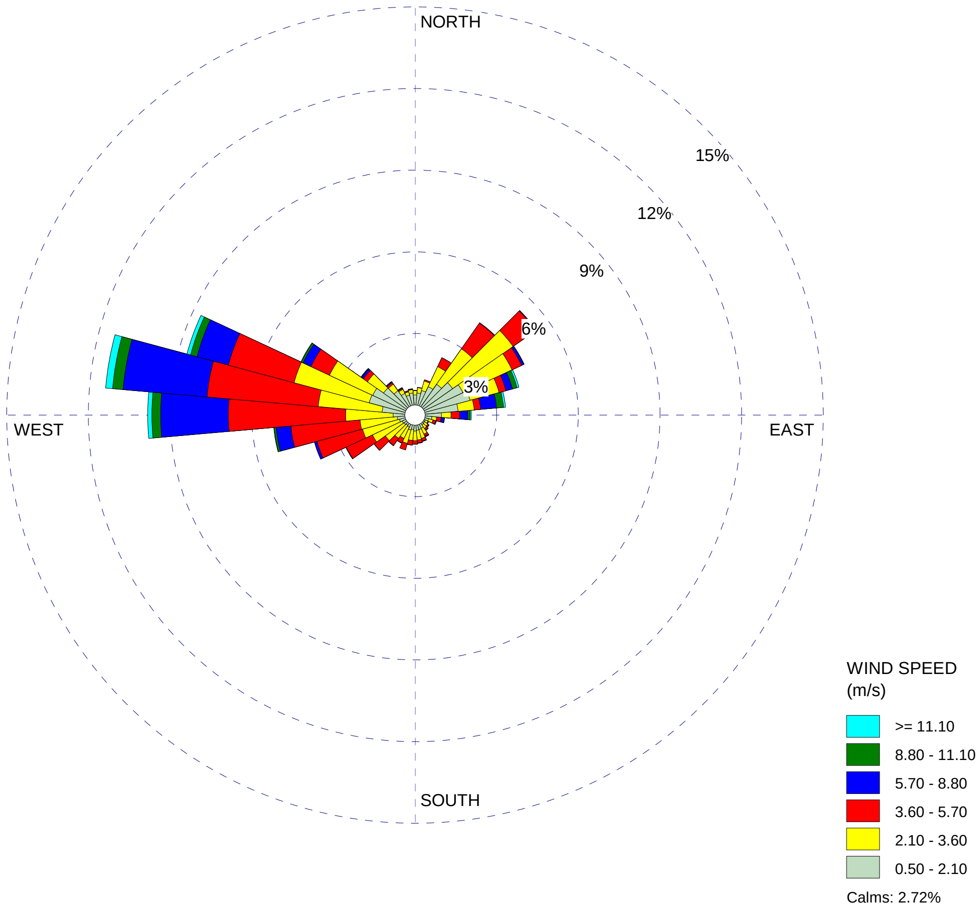
Annual, 2009 – 2013

WIND ROSE PLOT:

Oxnard, CA, 2009-2013
Annual

DISPLAY:

Wind Speed
Direction (blowing from)

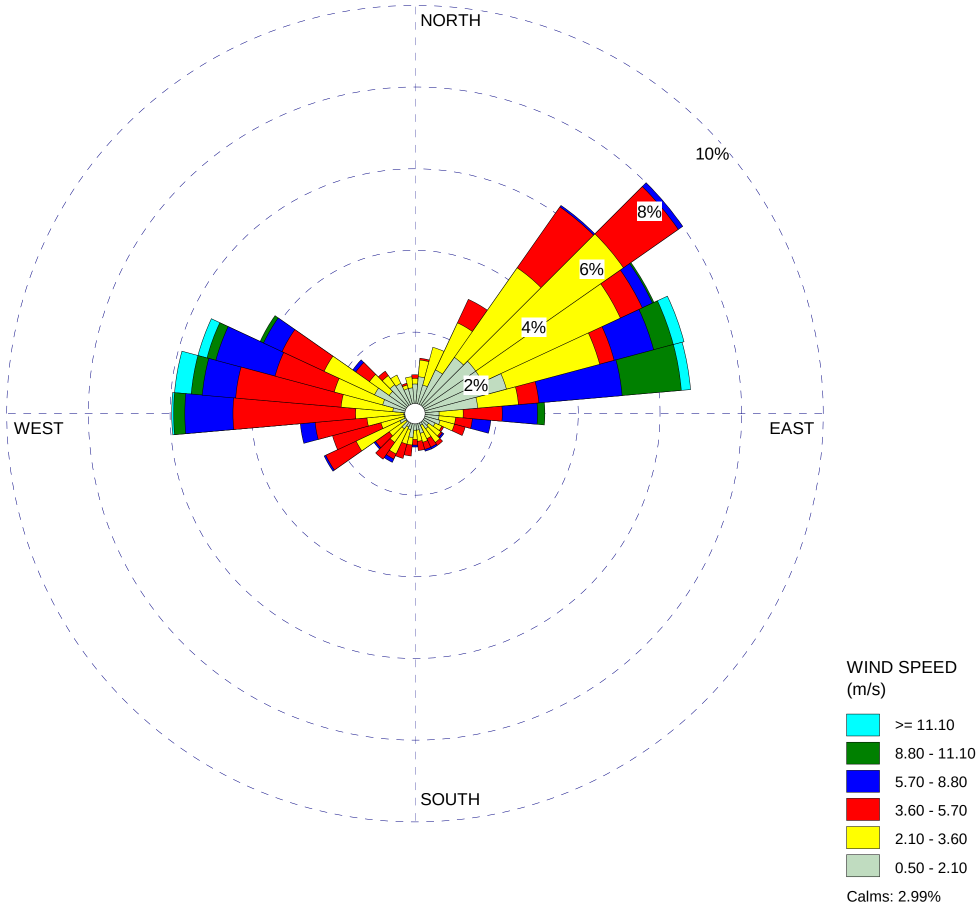


COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 1/1/2009 - 00:00 **End Date: 12/31/2013 - 16:00**	MODELER:	
	CALM WINDS: **2.72%**	TOTAL COUNT: **43599 hrs.**	
	AVG. WIND SPEED: **3.24 m/s**	DATE: **1/6/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

First Quarter, 2009

WIND ROSE PLOT:	DISPLAY:
Oxnard, CA, 2009 **First Quarter**	**Wind Speed** **Direction (blowing from)**



COMMENTS:	DATA PERIOD: **Start Date: 1/1/2009 - 00:00** **End Date: 3/31/2009 - 23:00**	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **2.99%**	TOTAL COUNT: **2151 hrs.**	
	AVG. WIND SPEED: **3.46 m/s**	DATE: **1/7/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

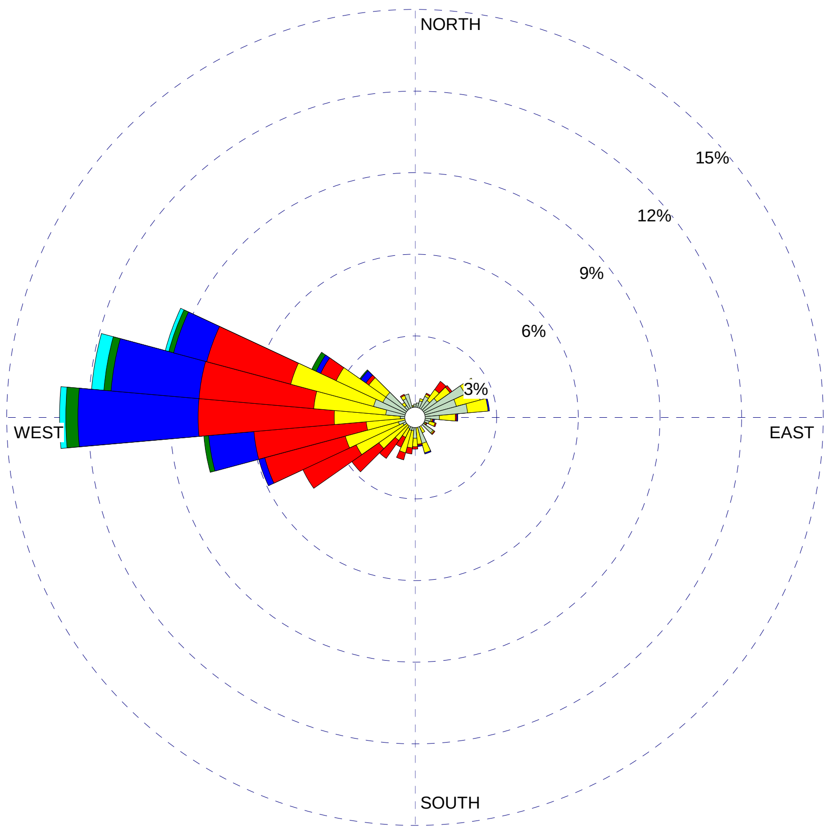
Second Quarter, 2009

WIND ROSE PLOT:

Oxnard, CA, 2009
Second Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



WIND SPEED
(m/s)

- >= 11.10
- 8.80 - 11.10
- 5.70 - 8.80
- 3.60 - 5.70
- 2.10 - 3.60
- 0.50 - 2.10

Calms: 3.73%

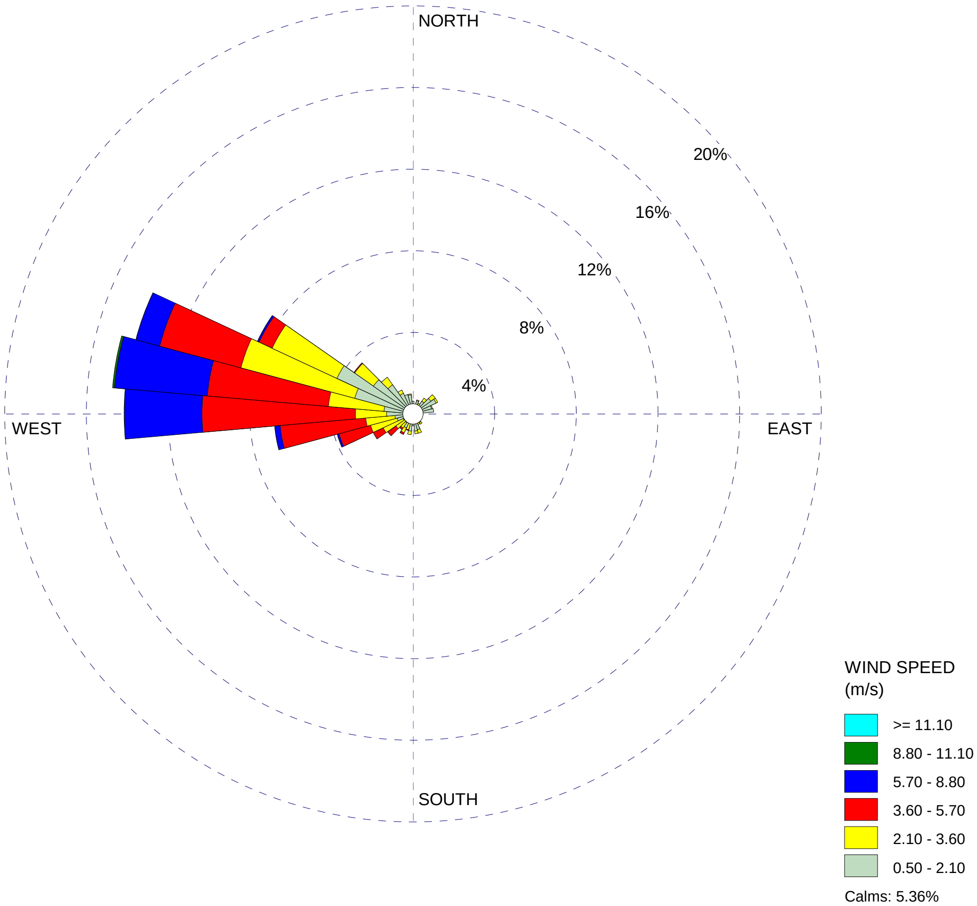
COMMENTS:	DATA PERIOD: **Start Date: 4/1/2009 - 00:00** **End Date: 6/30/2009 - 23:00**	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **3.73%**	TOTAL COUNT: **2174 hrs.**	
	AVG. WIND SPEED: **3.40 m/s**	DATE: **1/7/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Third Quarter, 2009

WIND ROSE PLOT:
Oxnard, CA, 2009
Third Quarter

DISPLAY:
Wind Speed
Direction (blowing from)

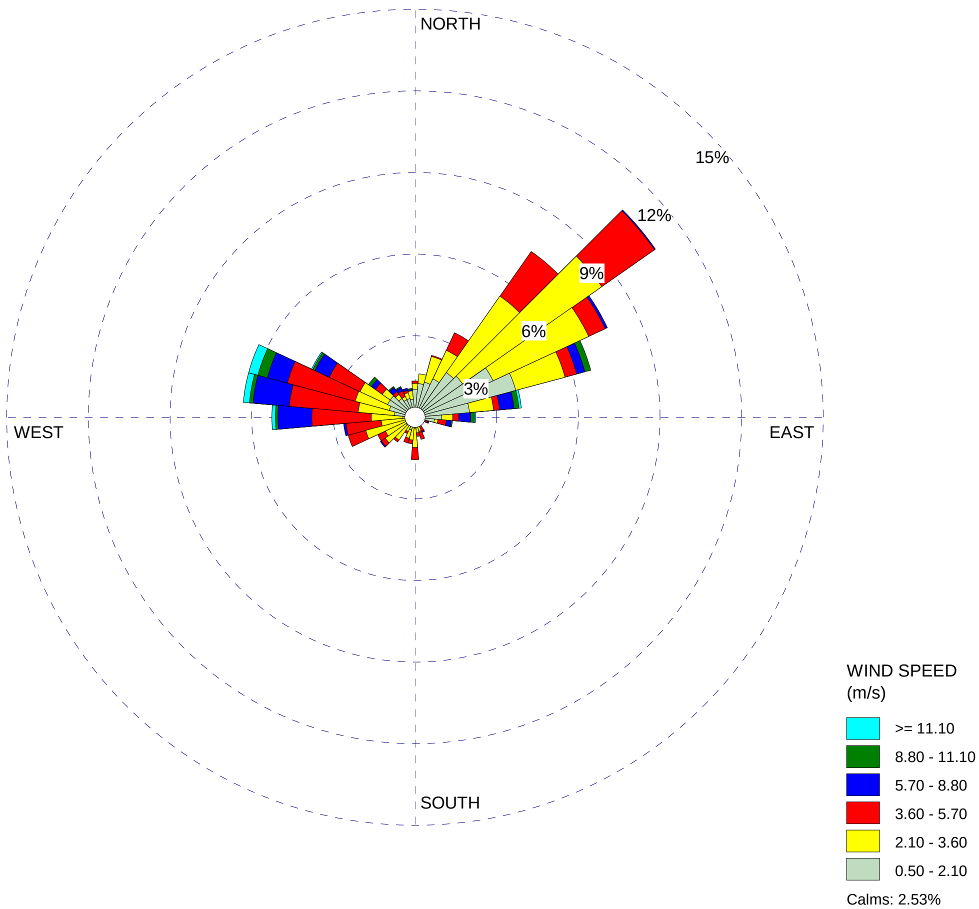


COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 7/1/2009 - 00:00 **End Date: 9/30/2009 - 23:00**	MODELER:	
	CALM WINDS: **5.36%**	TOTAL COUNT: **2186 hrs.**	
	AVG. WIND SPEED: **2.99 m/s**	DATE: **1/7/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Fourth Quarter, 2009

WIND ROSE PLOT: **Oxnard, CA, 2009** **Fourth Quarter**	DISPLAY: **Wind Speed** **Direction (blowing from)**



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 10/1/2009 - 00:00 **End Date: 12/31/2009 - 17:00**	MODELER:	
	CALM WINDS: **2.53%**	TOTAL COUNT: **2196 hrs.**	
	AVG. WIND SPEED: **3.09 m/s**	DATE: **1/7/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

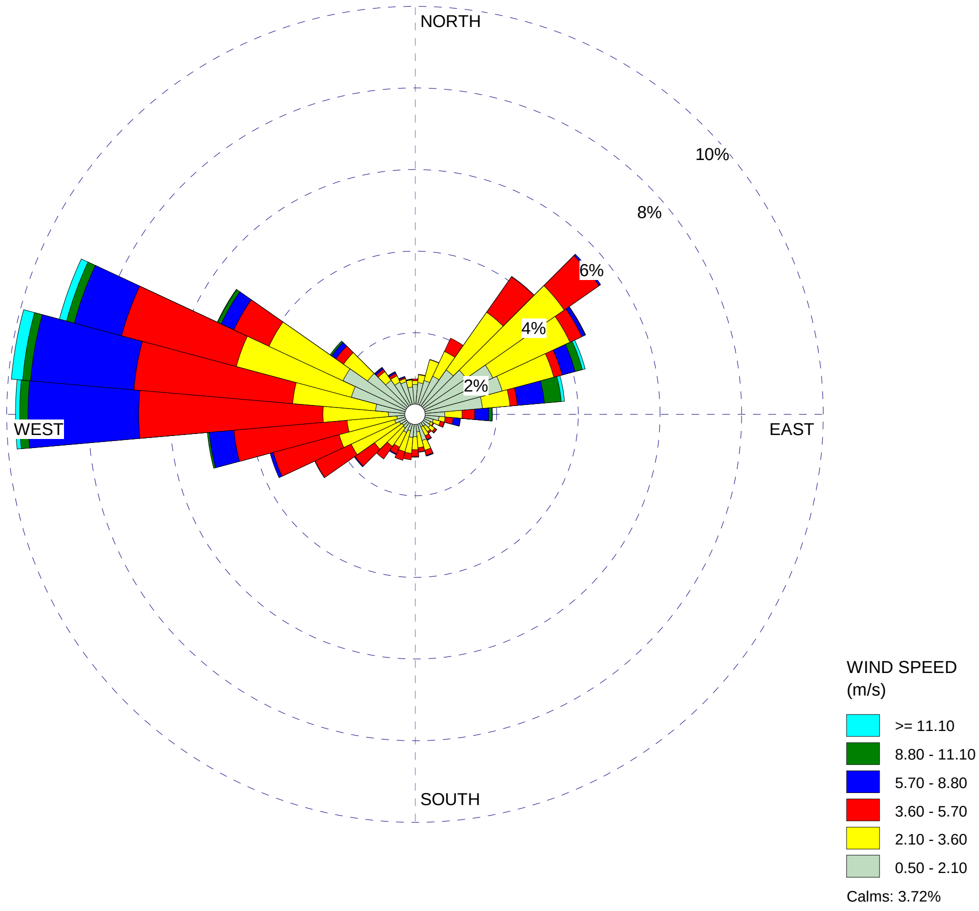
Annual, 2009

WIND ROSE PLOT:

Oxnard, CA, 2009
Annual

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 1/1/2009 - 00:00
End Date: 12/31/2009 - 17:00

COMPANY NAME:

MODELER:

CALM WINDS:

3.72%

TOTAL COUNT:

8707 hrs.

AVG. WIND SPEED:

3.24 m/s

DATE:

1/7/2015

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

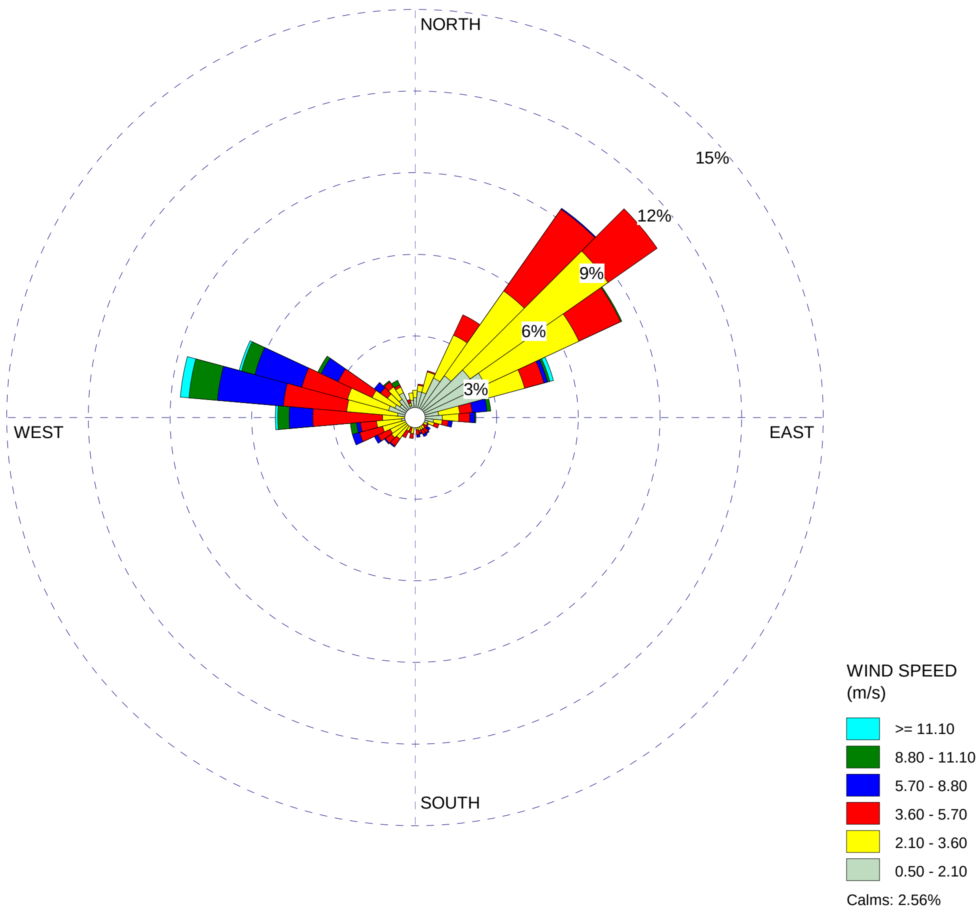
First Quarter, 2010

WIND ROSE PLOT:

Oxnard, CA, 2010
First Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 1/1/2010 - 00:00 **End Date: 3/31/2010 - 23:00**	MODELER:	
	CALM WINDS: **2.56%**	TOTAL COUNT: **2157 hrs.**	
	AVG. WIND SPEED: **3.35 m/s**	DATE: **1/7/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

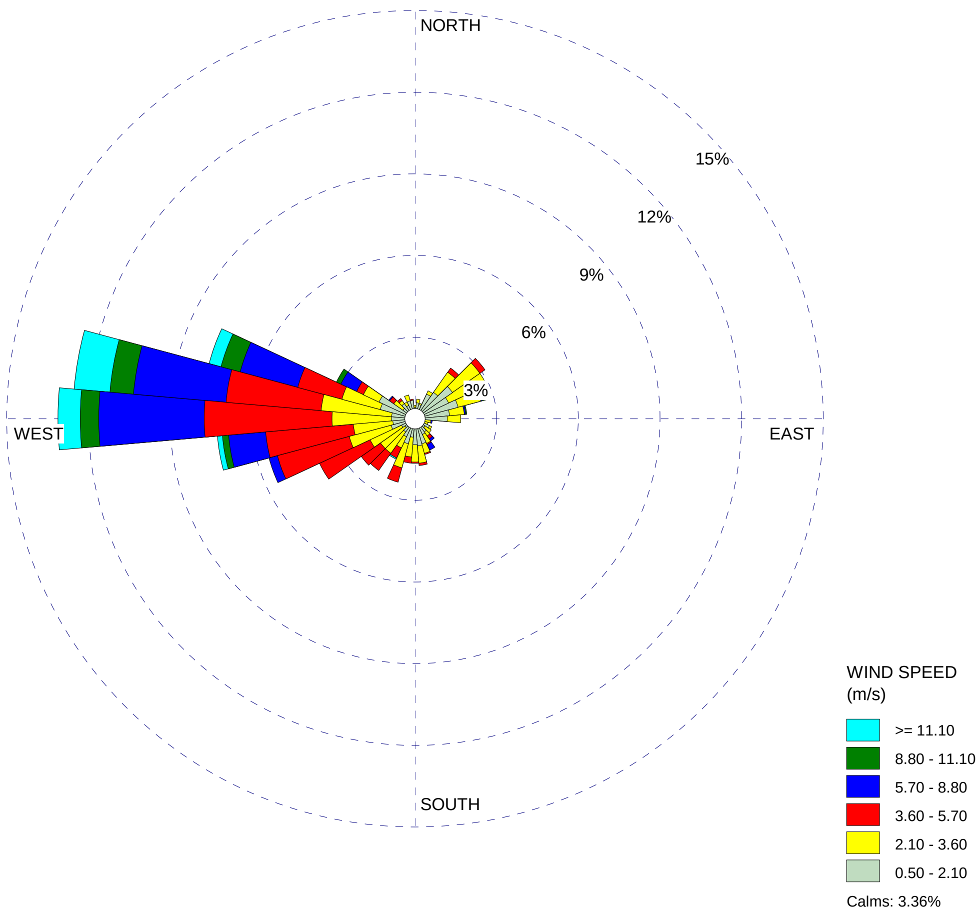
Second Quarter, 2010

WIND ROSE PLOT:

Oxnard, CA, 2010
Second Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 4/1/2010 - 00:00
End Date: 6/30/2010 - 23:00

COMPANY NAME:

MODELER:

CALM WINDS:

3.36%

TOTAL COUNT:

2170 hrs.

AVG. WIND SPEED:

3.66 m/s

DATE:

1/7/2015

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

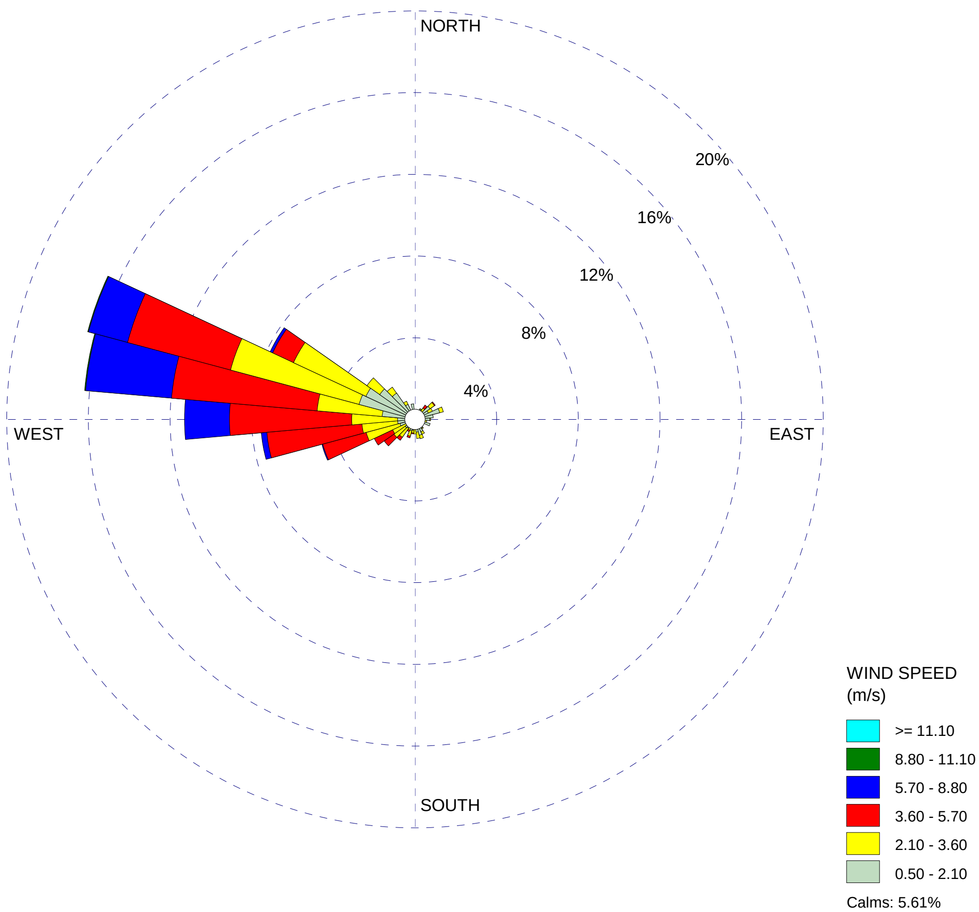
Third Quarter, 2010

WIND ROSE PLOT:

Oxnard, CA, 2010
Third Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 7/1/2010 - 00:00
End Date: 9/30/2010 - 23:00

COMPANY NAME:

MODELER:

CALM WINDS:

5.61%

TOTAL COUNT:

2197 hrs.

AVG. WIND SPEED:

3.09 m/s

DATE:

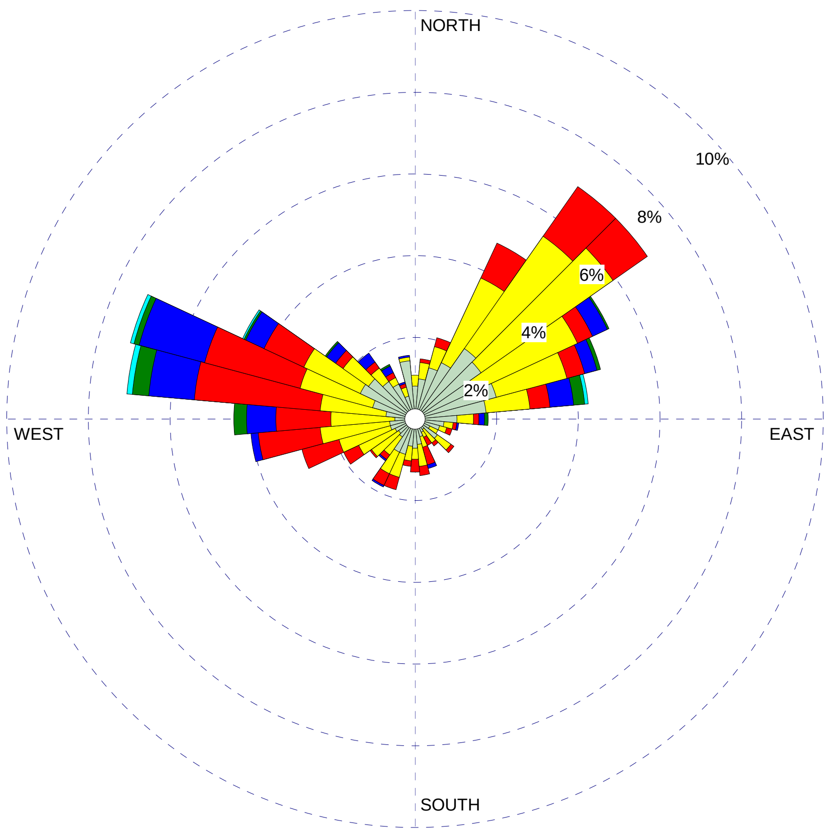
1/7/2015

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Fourth Quarter, 2010

WIND ROSE PLOT:	DISPLAY:
Oxnard, CA, 2010 **Fourth Quarter**	**Wind Speed** **Direction (blowing from)**



WIND SPEED
(m/s)

- >= 11.10
- 8.80 - 11.10
- 5.70 - 8.80
- 3.60 - 5.70
- 2.10 - 3.60
- 0.50 - 2.10

Calms: 2.01%

COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 10/1/2010 - 00:00 **End Date: 12/31/2010 - 23:00**	MODELER:	
	CALM WINDS: **2.01%**	TOTAL COUNT: **2205 hrs.**	
	AVG. WIND SPEED: **2.99 m/s**	DATE: **1/7/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

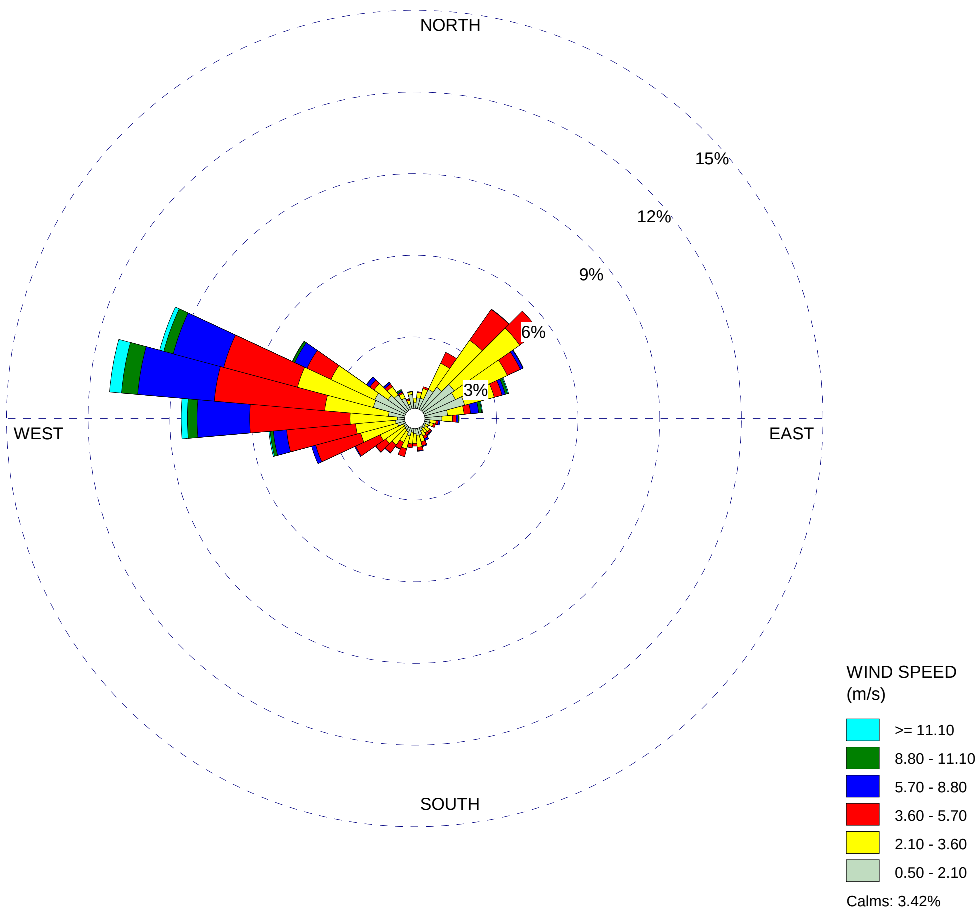
Annual, 2010

WIND ROSE PLOT:

Oxnard, CA, 2010
Annual

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **Start Date: 1/1/2010 - 00:00** **End Date: 12/31/2010 - 23:00**	COMPANY NAME: MODELER:	
	CALM WINDS: **3.42%**	TOTAL COUNT: **8729 hrs.**	
	AVG. WIND SPEED: **3.27 m/s**	DATE: **1/7/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

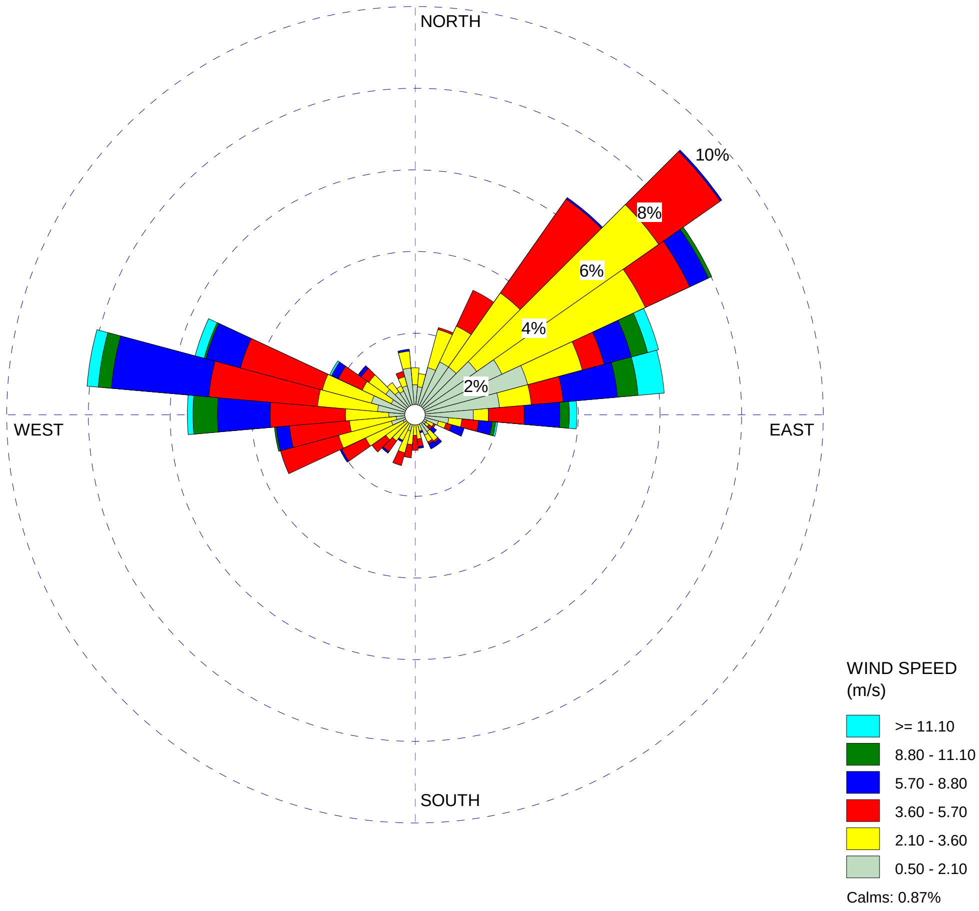
First Quarter, 2011

WIND ROSE PLOT:

Oxnard, CA, 2011
First Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 1/1/2011 - 00:00
End Date: 3/31/2011 - 23:00

COMPANY NAME:

MODELER:

CALM WINDS:

0.87%

TOTAL COUNT:

2152 hrs.

AVG. WIND SPEED:

3.51 m/s

DATE:

1/7/2015

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

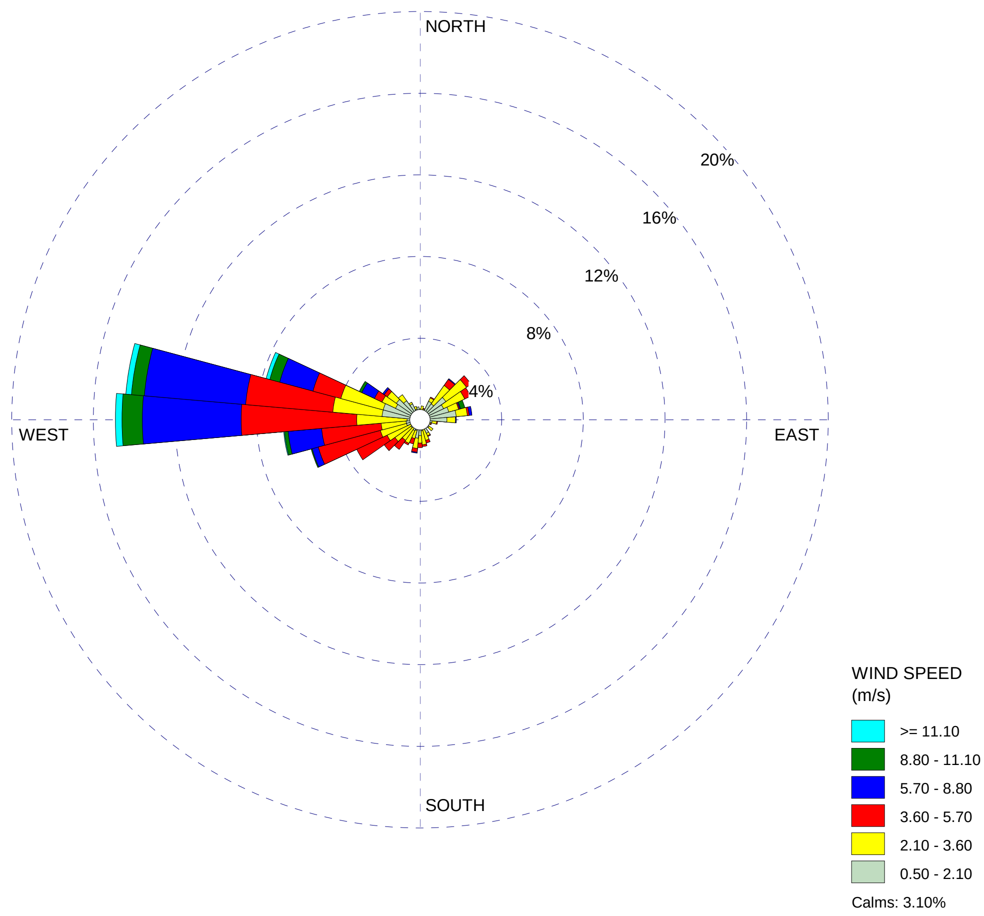
Second Quarter, 2011

WIND ROSE PLOT:

Oxnard, CA, 2011
Second Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 4/1/2011 - 00:00 **End Date: 6/30/2011 - 23:00**	MODELER:	
	CALM WINDS: **3.10%**	TOTAL COUNT: **2174 hrs.**	
	AVG. WIND SPEED: **3.56 m/s**	DATE: **1/7/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

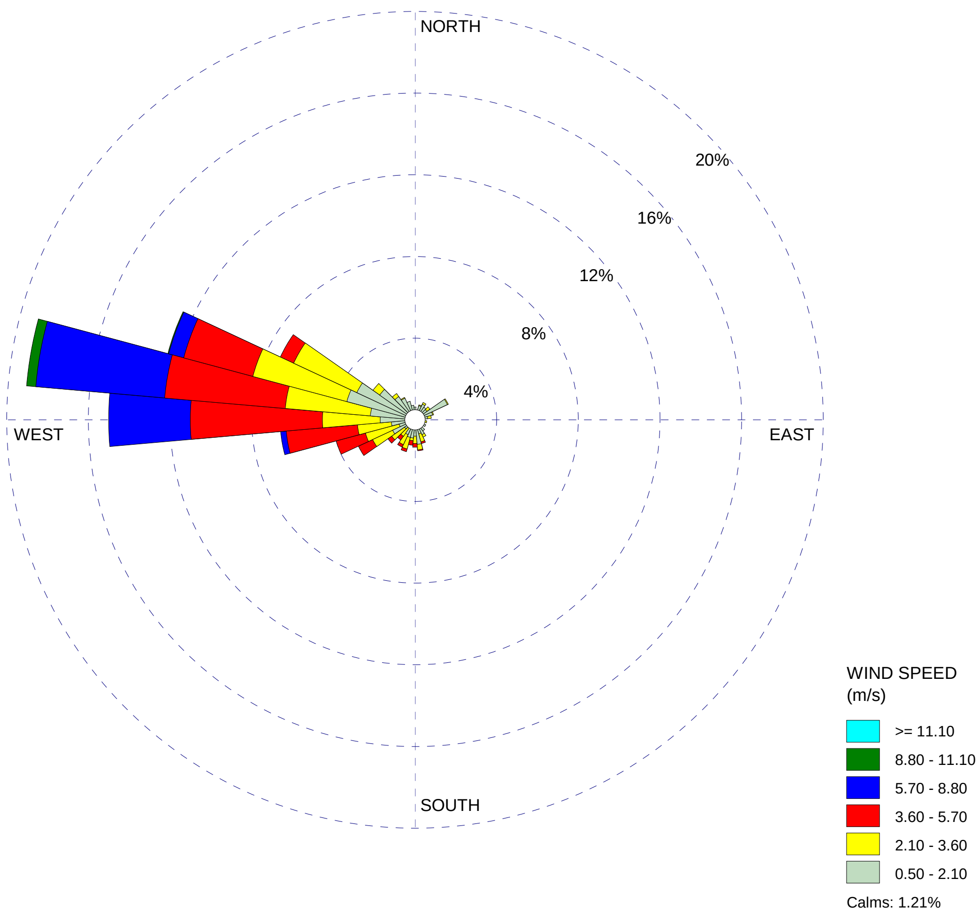
Third Quarter, 2011

WIND ROSE PLOT:

Oxnard, CA, 2011
Third Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **Start Date: 7/1/2011 - 00:00** **End Date: 9/30/2011 - 23:00**	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **1.21%**	TOTAL COUNT: **2208 hrs.**	
	AVG. WIND SPEED: **3.11 m/s**	DATE: **1/7/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

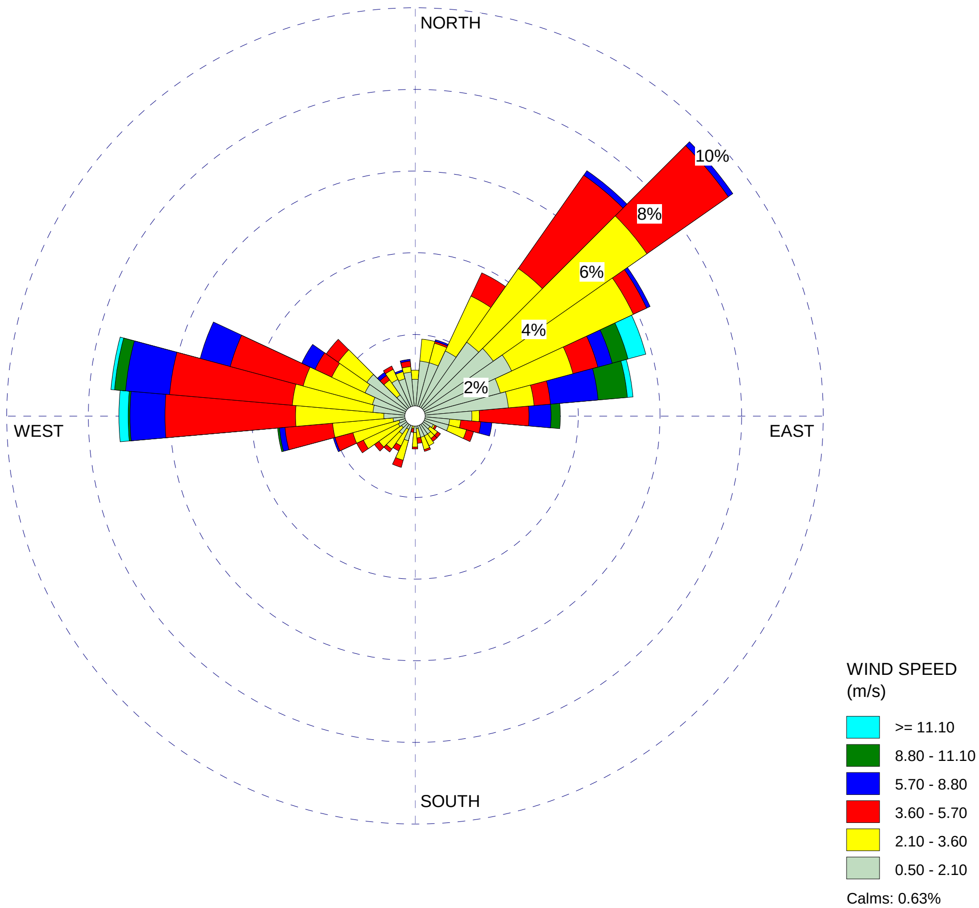
Fourth Quarter, 2011

WIND ROSE PLOT:

Oxnard, CA, 2011
Fourth Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 10/1/2011 - 00:00 **End Date: 12/31/2011 - 19:00**	MODELER:	
	CALM WINDS: **0.63%**	TOTAL COUNT: **2203 hrs.**	
	AVG. WIND SPEED: **3.09 m/s**	DATE: **1/7/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

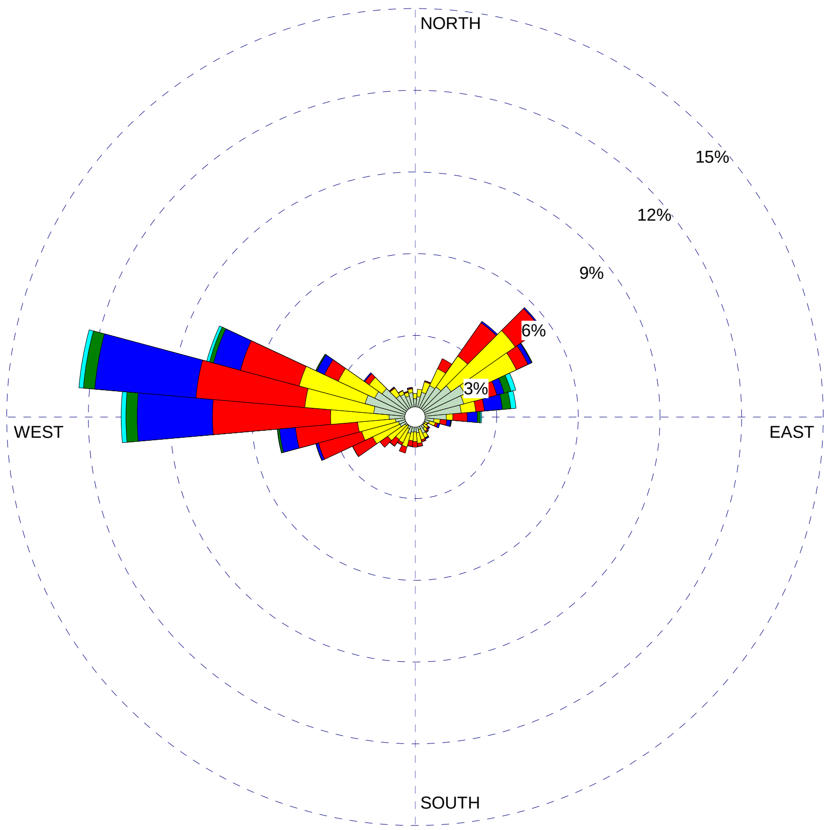
Annual, 2011

WIND ROSE PLOT:

Oxnard, CA, 2011
Annual

DISPLAY:

Wind Speed
Direction (blowing from)



WIND SPEED
(m/s)

- >= 11.10
- 8.80 - 11.10
- 5.70 - 8.80
- 3.60 - 5.70
- 2.10 - 3.60
- 0.50 - 2.10

Calms: 1.46%

COMMENTS:	DATA PERIOD: **Start Date: 1/1/2011 - 00:00** **End Date: 12/31/2011 - 19:00**	COMPANY NAME:	
		MODELER:	
	CALM WINDS: **1.46%**	TOTAL COUNT: **8737 hrs.**	
	AVG. WIND SPEED: **3.32 m/s**	DATE: **1/7/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

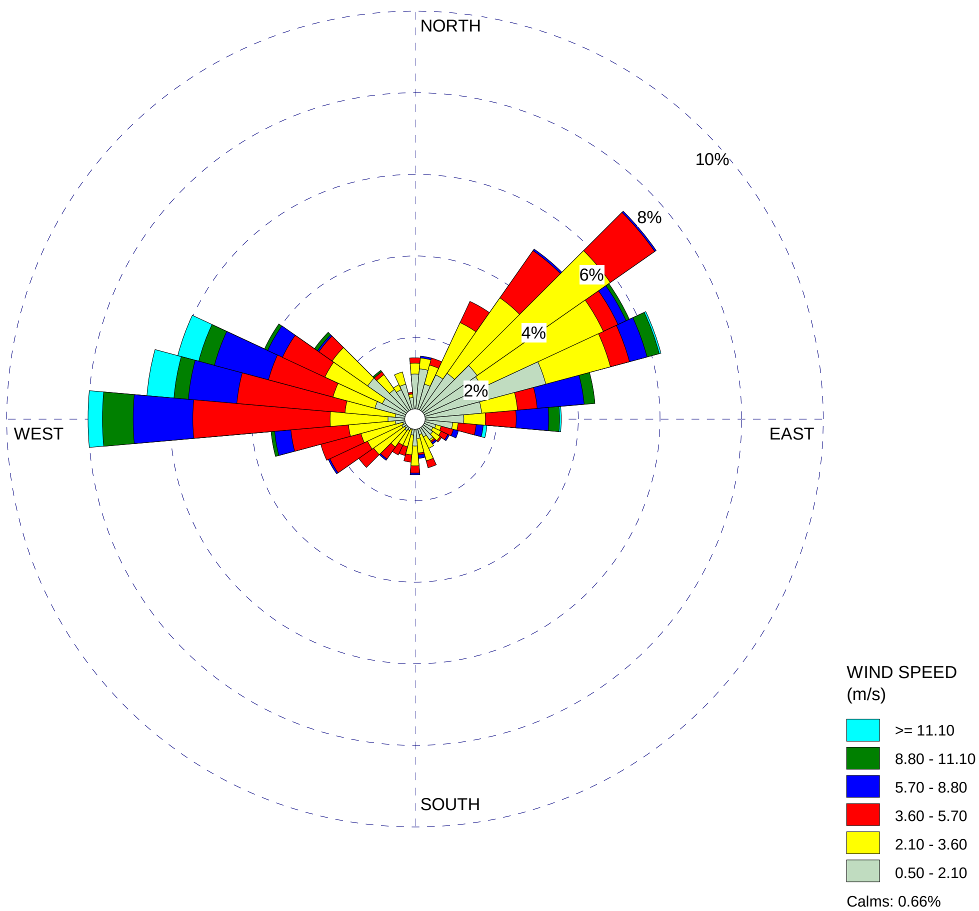
First Quarter, 2012

WIND ROSE PLOT:

Oxnard, CA, 2012
First Quater

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 1/1/2012 - 00:00
End Date: 3/31/2012 - 23:00

COMPANY NAME:

MODELER:

CALM WINDS:

0.66%

TOTAL COUNT:

2184 hrs.

AVG. WIND SPEED:

3.46 m/s

DATE:

1/7/2015

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

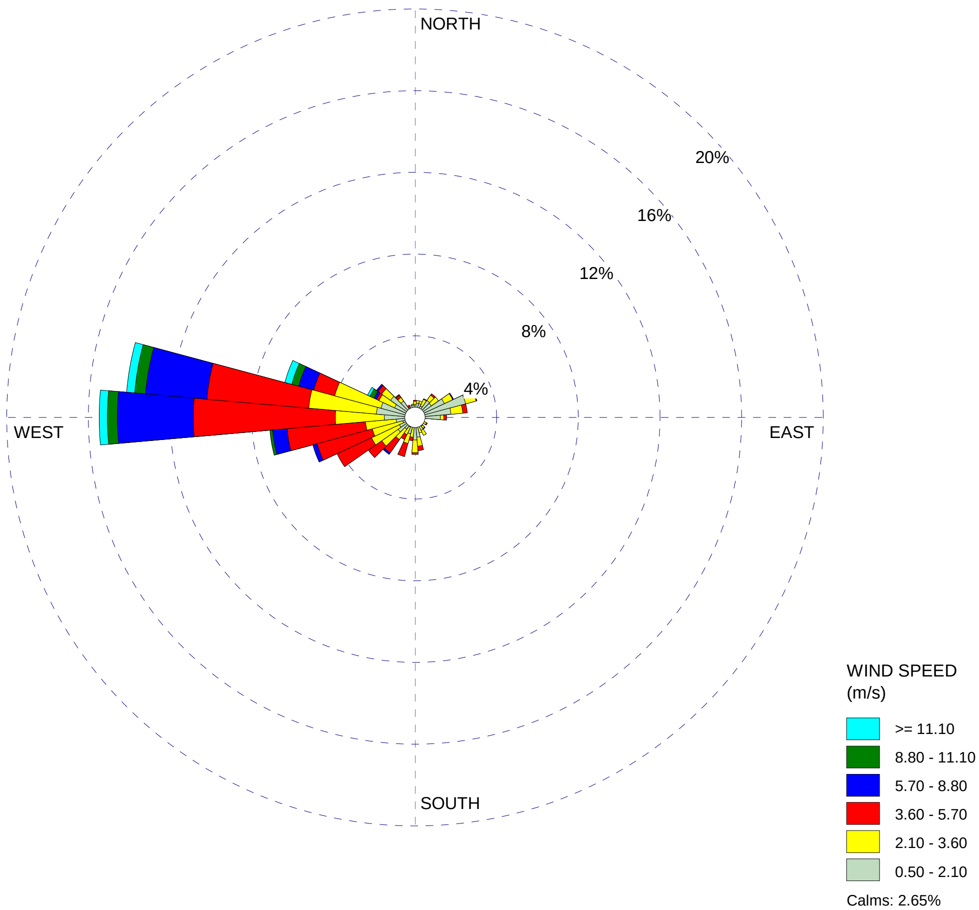
Second Quarter, 2012

WIND ROSE PLOT:

Oxnard, CA, 2012
Second Quater

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 4/1/2012 - 00:00 **End Date: 6/30/2012 - 23:00**	MODELER:	
	CALM WINDS: **2.65%**	TOTAL COUNT: **2180 hrs.**	
	AVG. WIND SPEED: **3.32 m/s**	DATE: **1/7/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

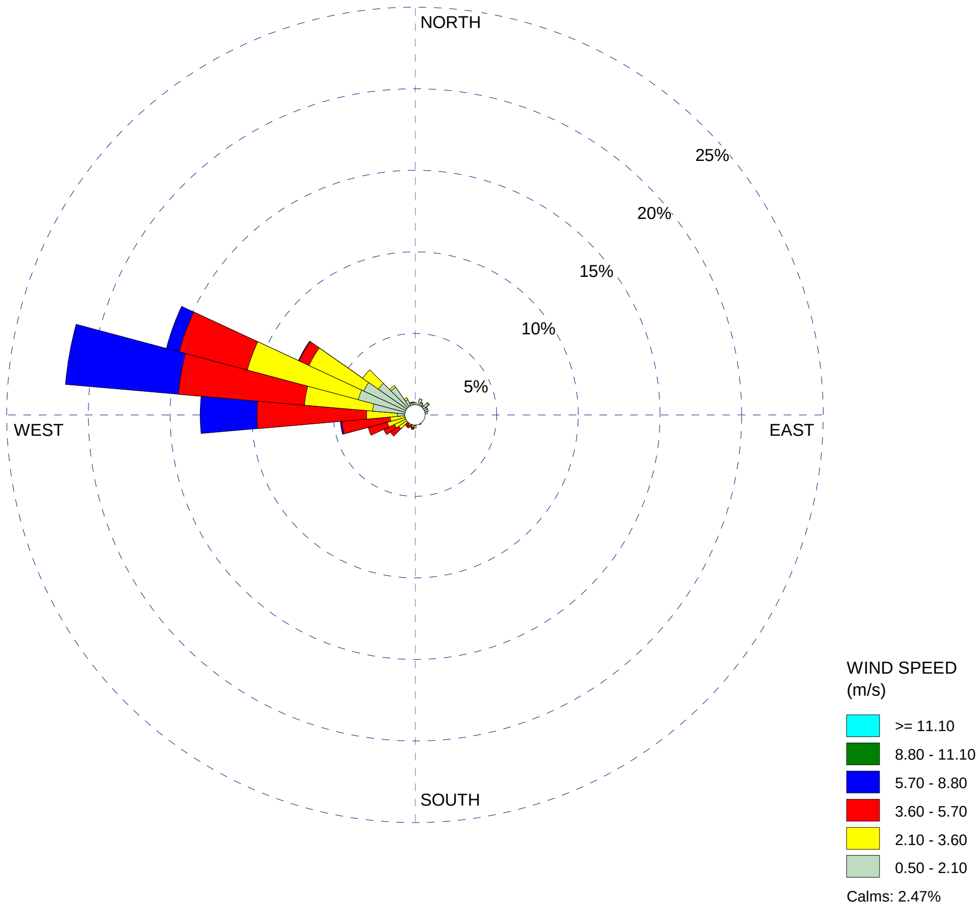
Third Quarter, 2012

WIND ROSE PLOT:

Oxnard, CA, 2012
Thrid Quater

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 7/1/2012 - 00:00
End Date: 9/30/2012 - 23:00

COMPANY NAME:

MODELER:

CALM WINDS:

2.47%

TOTAL COUNT:

2144 hrs.

AVG. WIND SPEED:

3.14 m/s

DATE:

1/7/2015

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

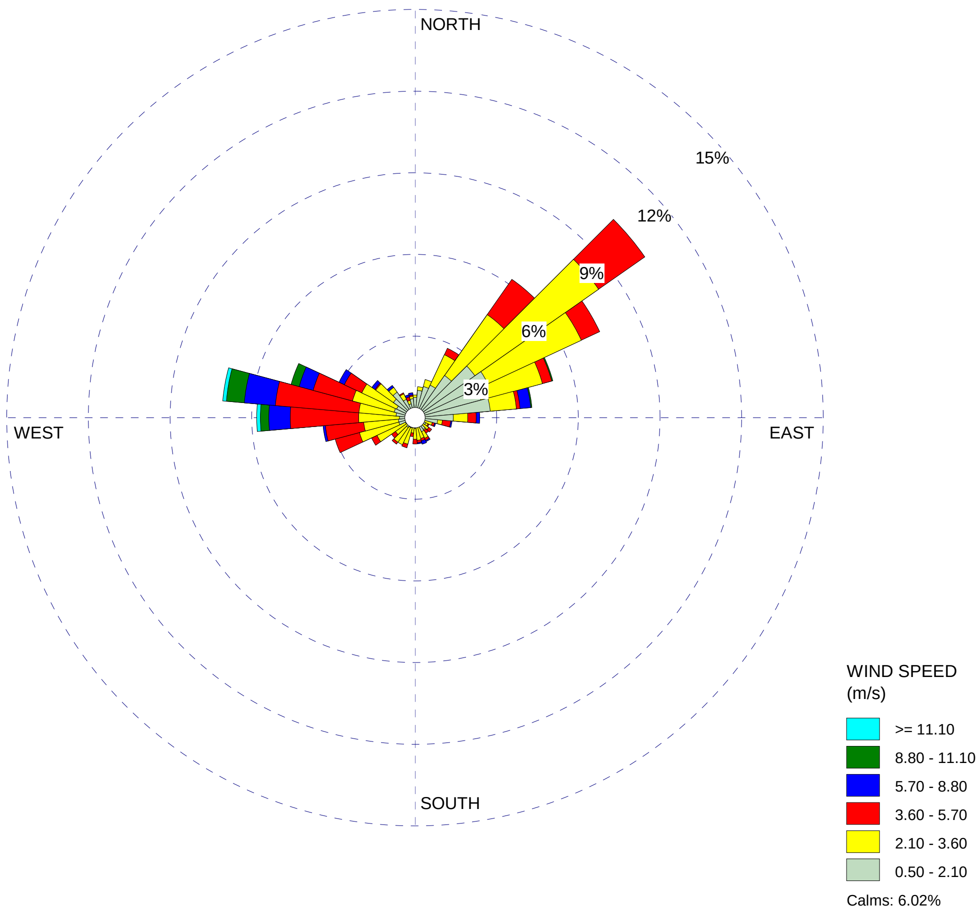
Fourth Quarter, 2012

WIND ROSE PLOT:

Oxnard, CA, 2012
Fourth Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 10/1/2012 - 00:00
End Date: 12/31/2012 - 16:00

COMPANY NAME:

MODELER:

CALM WINDS:

6.02%

TOTAL COUNT:

2194 hrs.

AVG. WIND SPEED:

2.75 m/s

DATE:

1/7/2015

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

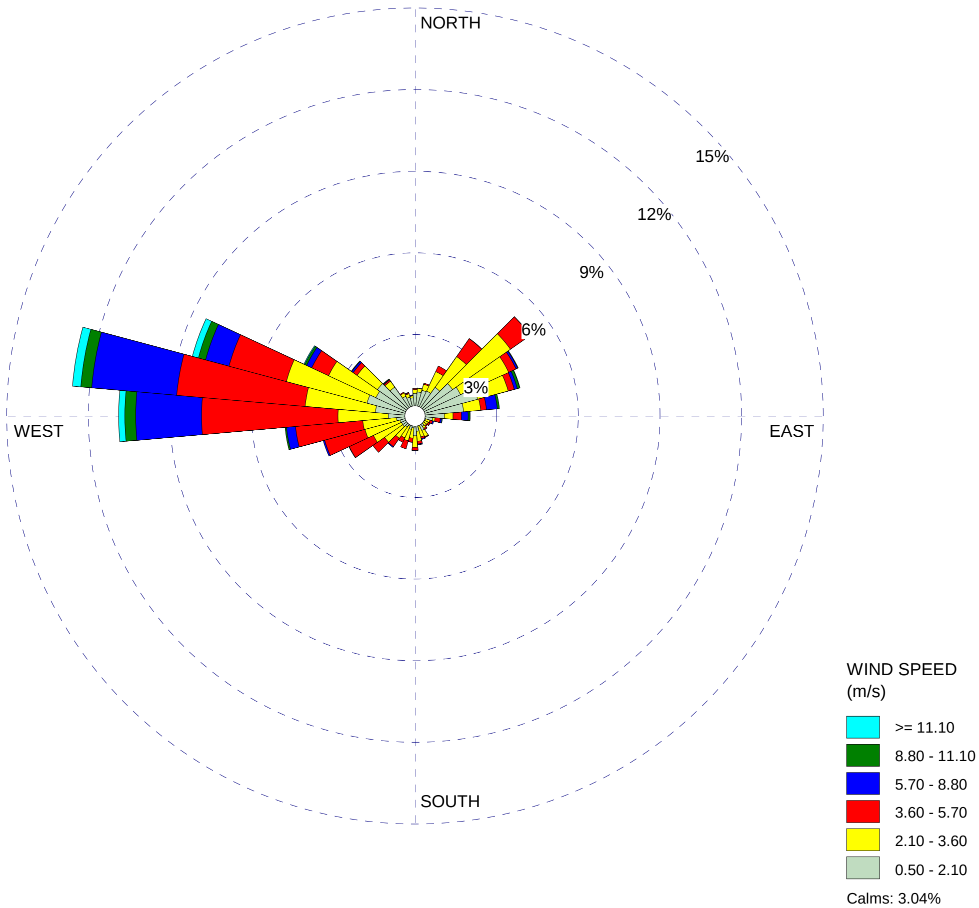
Annual, 2012

WIND ROSE PLOT:

Oxnard, CA, 2012
Annual

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 1/1/2012 - 00:00
End Date: 12/31/2012 - 16:00

COMPANY NAME:

MODELER:

CALM WINDS:

3.04%

TOTAL COUNT:

8702 hrs.

AVG. WIND SPEED:

3.17 m/s

DATE:

1/7/2015

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

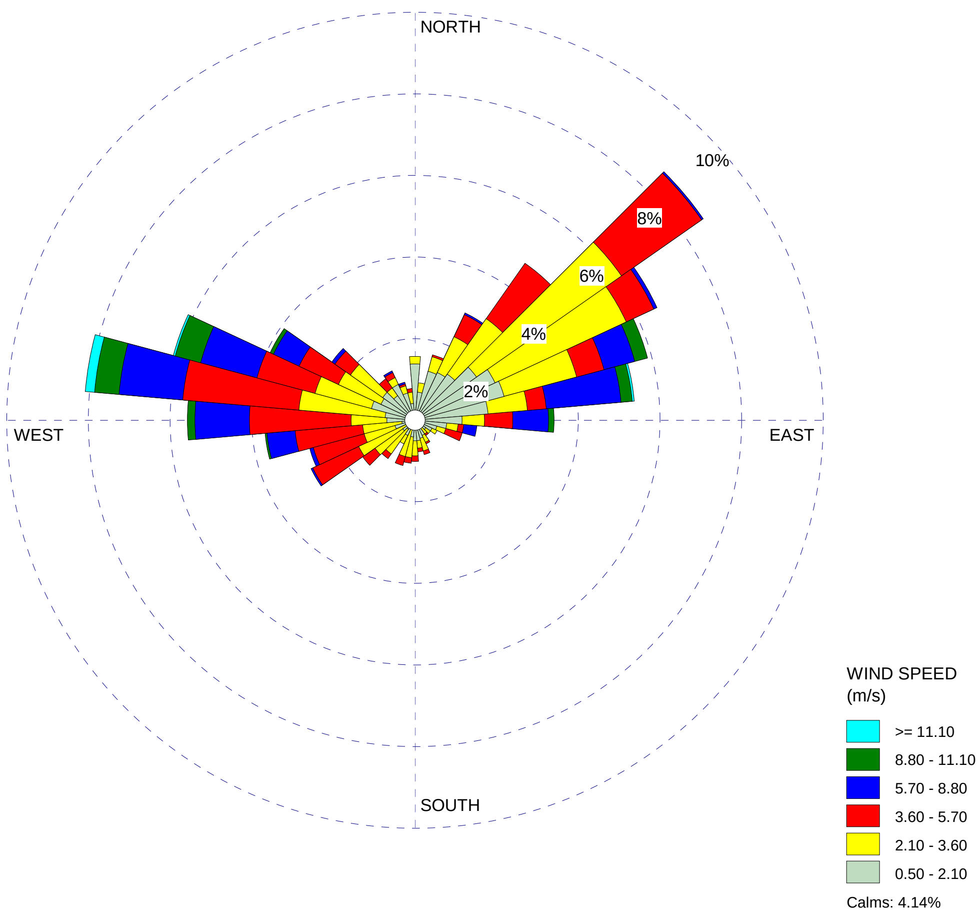
First Quarter, 2013

WIND ROSE PLOT:

Oxnard, CA, 2013
First Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 1/1/2013 - 00:00
End Date: 3/31/2013 - 23:00

COMPANY NAME:

MODELER:

CALM WINDS:

4.14%

TOTAL COUNT:

2140 hrs.

AVG. WIND SPEED:

3.29 m/s

DATE:

1/7/2015

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

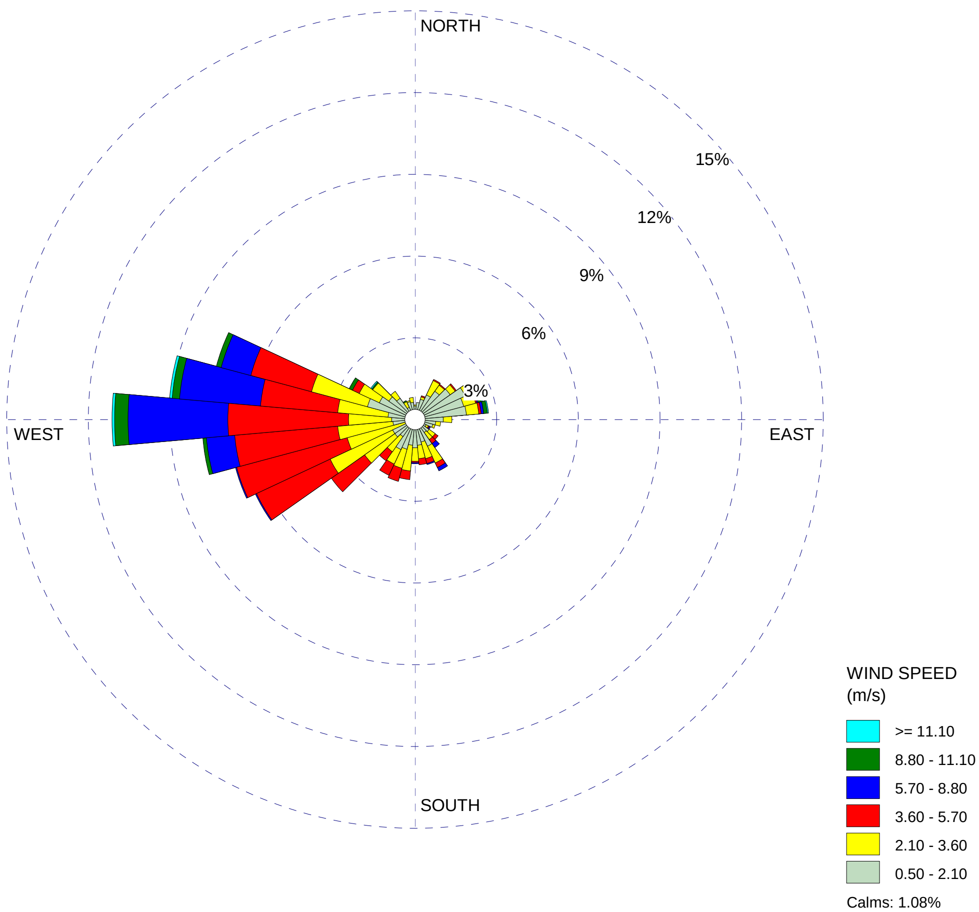
Second Quarter, 2013

WIND ROSE PLOT:

Oxnard, CA, 2013
Second Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 4/1/2013 - 00:00
End Date: 6/30/2013 - 23:00

COMPANY NAME:

MODELER:

CALM WINDS:

1.08%

TOTAL COUNT:

2180 hrs.

AVG. WIND SPEED:

3.22 m/s

DATE:

1/7/2015

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

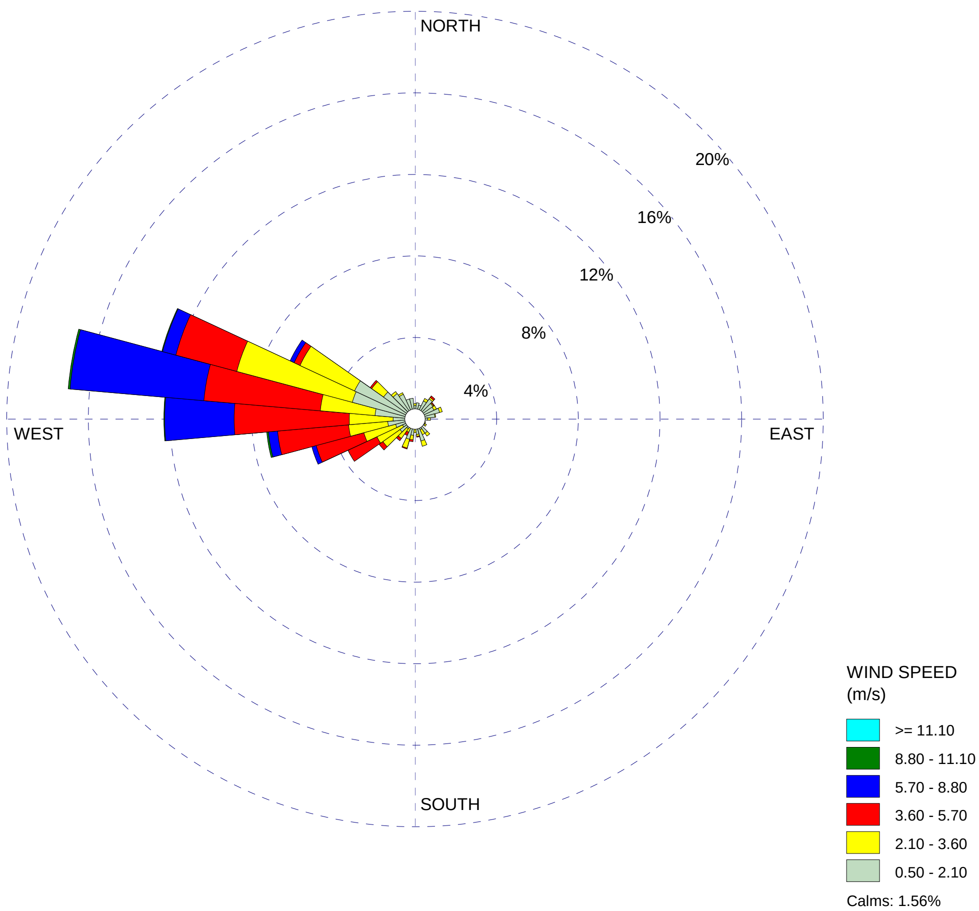
Third Quarter, 2013

WIND ROSE PLOT:

Oxnard, CA, 2013
Third Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

DATA PERIOD:

Start Date: 7/1/2013 - 00:00
End Date: 9/30/2013 - 23:00

COMPANY NAME:

MODELER:

CALM WINDS:

1.56%

TOTAL COUNT:

2204 hrs.

AVG. WIND SPEED:

3.08 m/s

DATE:

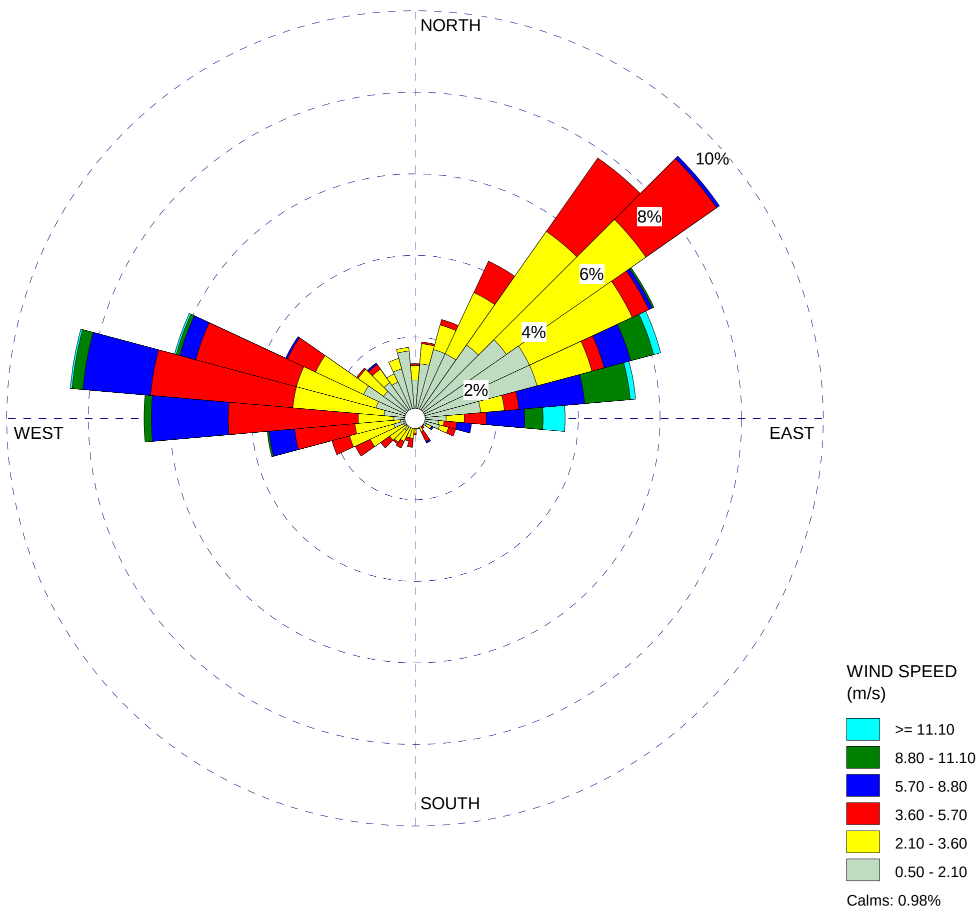
1/7/2015

PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Fourth Quarter, 2013

WIND ROSE PLOT:	DISPLAY:
Oxnard, CA, 2013 **Fourth Quarter**	**Wind Speed** **Direction (blowing from)**



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 10/1/2013 - 00:00 **End Date: 12/31/2013 - 16:00**	MODELER:	
	CALM WINDS: **0.98%**	TOTAL COUNT: **2200 hrs.**	
	AVG. WIND SPEED: **3.32 m/s**	DATE: **1/7/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

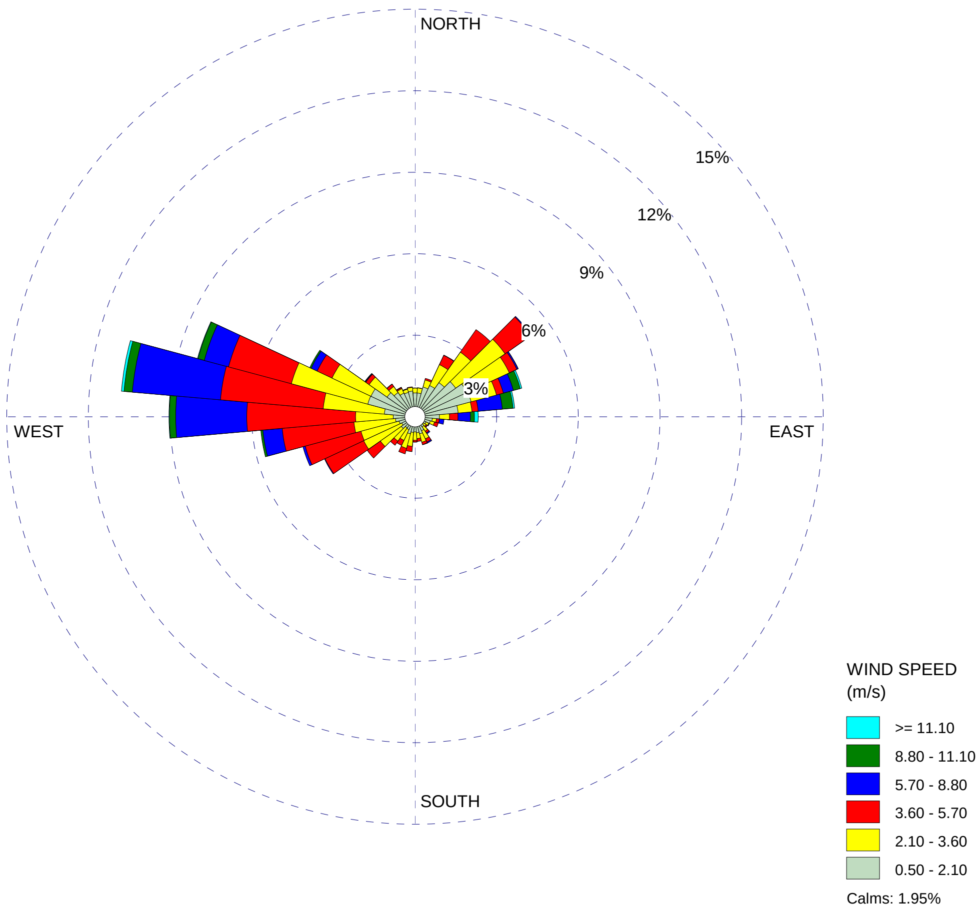
Annual, 2013

WIND ROSE PLOT:

Oxnard, CA, 2013
Annual

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 1/1/2013 - 00:00 **End Date: 12/31/2013 - 16:00**		
		MODELER:	
	CALM WINDS: **1.95%**	TOTAL COUNT: **8724 hrs.**	
	AVG. WIND SPEED: **3.23 m/s**	DATE: **1/7/2015**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

APPENDIX C-2

DETAILED EMISSIONS CALCULATIONS/ENGINEERING SPECIFICATIONS

Table C-2.1
Puente Power Project

Performance Runs for Gas Turbine

Ambient Condition	Winter	Winter	ISO	ISO	Summer	Summer	Summer	Summer	Summer	Summer
Ambient Temperature (deg. F)	38.9	38.9	59	59	77.8	77.8	77.8	82	82	82
Relative Humidity, %	26%	26%	60%	60%	50%	50%	50%	31%	31%	31%
Load	Maximum	Minimum	Maximum	Minimum	Maximum	Maximum	Minimum	Maximum	Maximum	Minimum
Evap Cooling?	Off	Off	Off	Off	On	Off	Off	On	Off	Off
Output Summary										
Gross Output, MW	278	83	275	82	267	253	87	270	247	89
HHV Fuel Input, MMBtu/hr	2,579.09	1,176.50	2,567.81	1,159.67	2,513.13	2,392.95	1,179.34	2,534.45	2,348.76	1,191.87
Fuel Flow, scf/hr	2,537,233	1,156,852	2,525,966	1,140,403	2,471,887	2,352,461	1,159,781	2,492,166	2,309,648	1,171,949
Stack Parameters										
Stack Exhaust Flow, 1000s lb/hr	6,147.00	3,496.00	6,272.00	3,506.00	6,201.00	6,006.00	3,586.00	6,252.00	5,955.00	3,634.00
Stack Exhaust Temperature, Deg.F	900	900	900	900	900	900	900	900	900	900
Exhaust Composition, Vol %										
N_2	75.48%	75.96%	74.94%	75.39%	74.30%	74.56%	74.97%	74.51%	74.93%	75.29%
O_2	13.99%	15.34%	14.01%	15.29%	13.92%	14.09%	15.19%	13.97%	14.23%	15.29%
CO_2	3.21%	2.59%	3.12%	2.54%	3.08%	3.03%	2.52%	3.09%	3.01%	2.53%
H_2O	6.41%	5.20%	7.03%	5.88%	7.81%	7.43%	6.42%	7.54%	6.94%	5.99%
Ar	0.90%	0.90%	0.89%	0.90%	0.88%	0.89%	0.89%	0.89%	0.89%	0.90%
Molecular Weight	28.55	28.63	28.48	28.55	28.39	28.43	28.49	28.42	28.48	28.54
Stack Exhaust Flow, 1000s ACFM	3,551.20	2,026.94	3,631.02	2,037.43	3,601.37	3,485.05	2,087.61	3,626.46	3,450.84	2,111.79
Stack Emission Rates										
NO_x, ppmvd@15% O_2	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
CO, ppmvd@15% O_2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
ROC as CH_4, ppmvd@15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
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
Particulates, lb/hr	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6
NO_x, lb/hr	23.4	10.6	23.3	10.5	22.8	21.7	10.7	23.0	21.3	10.8
CO, lb/hr	22.8	10.4	22.7	10.2	22.2	21.1	10.4	22.4	20.7	10.5
ROC as CH_4, lb/hr	6.5	3.0	6.5	2.9	6.4	6.0	3.0	6.4	5.9	3.0
NH_3 Slip, lb---mole/hr	1.01	0.49	1.01	0.47	0.99	0.94	0.48	1	0.92	0.49

Table C-2.2
Puente Power Project
Gas Turbine Hourly Emissions - Startup/Shutdown Emissions

Gas Turbine - Hourly Startup Emissions											
	Time (minutes)	NOx Emissions (lbs/hr)	CO Emissions (lbs/hr)	ROC Emissions (lbs/hr)	PM10 Emissions (lbs/hr)	SOx Emissions (lbs/hr)	NOx Emissions (lbs)	CO Emissions (lbs)	ROC Emissions (lbs)	PM10 Emissions (lbs)	SOx Emissions (lbs)
Maximum Startup Emissions	30	N/A	N/A	N/A	N/A	5.4	87.0	167.0	17.0	3.7	2.7
Maximum Normal Operation Emissions	30	23.4	22.8	6.5	10.6	5.4	11.7	11.4	3.3	5.3	2.7
Total =	60						98.7	178.4	20.3	9.0	5.4

Gas Turbine - Hourly Shutdown Emissions											
	Time (minutes)	NOx Emissions (lbs/hr)	CO Emissions (lbs/hr)	ROC Emissions (lbs/hr)	PM10 Emissions (lbs/hr)	SOx Emissions (lbs/hr)	NOx Emissions (lbs)	CO Emissions (lbs)	ROC Emissions (lbs)	PM10 Emissions (lbs)	SOx Emissions (lbs)
Maximum Shutdown Emissions	12	N/A	N/A	N/A	N/A	5.4	4.0	145.0	25.0	1.5	1.1
Maximum Normal Operation Emissions	48	23.4	22.8	6.5	10.6	5.4	18.7	18.2	5.2	8.5	4.4
Total =	60						22.7	163.2	30.2	10.0	5.4

Gas Turbine - Hourly Startup/Shutdown/Restart Emissions											
	Time (minutes)	NOx Emissions (lbs/hr)	CO Emissions (lbs/hr)	ROC Emissions (lbs/hr)	PM10 Emissions (lbs/hr)	SOx Emissions (lbs/hr)	NOx Emissions (lbs)	CO Emissions (lbs)	ROC Emissions (lbs)	PM10 Emissions (lbs)	SOx Emissions (lbs)
Maximum Startup Emissions	30	N/A	N/A	N/A	N/A	5.4	87.0	167.0	17.0	3.7	2.7
Maximum Shutdown Emissions	12	N/A	N/A	N/A	N/A	5.4	4.0	145.0	25.0	1.5	1.1
Maximum Restart Emissions*	18	N/A	N/A	N/A	N/A	5.4	52.2	100.2	10.2	2.2	1.6
Total =	60						143.2	412.2	52.2	7.4	5.4

Note: * Calculated based on maximum startup emissions reduced for 18 minute period.

TABLE C-2.3

GE 7HA.01 SIMPLE CYCLE CTG

OPERATION EMISSIONS

GE Energy

Andrew Dicke
Environmental Marketing Manager
Power Generation Products

1 River Road,
Schenectady, NY 12345
USA

T 518-385-4708
C 518-698-9807
E Andrew.Dicke@GE.com

Mr. Steve Rose
Sr Director - Development Engineering
1000 Main Street
Houston, TX 77002

January 9, 2015

Dear Mr. Steve Rose:

Per your request, GE confirms that the NRG Mandalay Bay 7HA.01 gas turbine, installed in a simple cycle configuration and equipped with an SCR and CO catalyst will achieve the following steady state operation emission values.

Constituent	**Steady state stack emissions during emission compliance mode**
NOx	2.5 ppmvd, Ref 15%O2
CO	4.0 ppmvd, Ref 15%O2
VOC	2.0 ppmvd, Ref 15%O2
NH3	5.0 ppmvd, Ref 15%O2
Total Particulates	10.6 lbs/hr

Please do not hesitate to contact me if you have any questions.

Best regards,

Andrew Dicke
PGP Environmental Marketing Manager

cc: M. Thuillez
C. Dutcher
A. St. John – Grover
P. Kulkarni
C. Matis

Table C-2.4
Puente Power Project
Gas Turbine Commissioning Schedule

Day	Activity	Duration (hr)	GT Load (%)	No. of GT Shutdowns	Daily Fuel Consumption (MMSCF-HHV)	Daily Energy Production (MWh)	Total Emissions NOx (lbs)	CO (lbs)	ROC (lbs)	PM10 (lbs)	SOx (lbs)	SCR (Y/N)	Calculated Hourly Emissions (lbs/hr) Nox	CO	ROC	PM10*	SOx*
1	GT Testing (1st Fire, FSNL)	8	0	1	4.8	0.0	1076.5	15783.7	1312.9	85.2	9.9	N	134.6	1,973.0	164.1	10.6	5.4
2	GT Testing (FSNL, Excitation Test, Dummy Synch Checks)	8	0	1	4.8	0.0	1076.5	15783.7	1312.9	85.2	9.9	N	134.6	1,973.0	164.1	10.6	5.4
3	GT Testing / Initial 4 Hour Run / Overspeed Testing	8	0-50	1.0	13.9	1,091.3	1560.2	6163.1	544.6	86.9	28.5	N	195.0	770.4	68.1	10.6	5.4
4	Base Load Run-In Lean-Lean for Strainer Cleaniliness	10	100	1.0	27.6	2,750.0	2443.7	830.2	107.8	111.2	56.6	N	244.4	83.0	10.8	10.6	5.4
5	GT Testing / DLN Tuning	8	0-50	1.0	13.9	1,091.3	1560.2	6163.1	544.6	86.9	28.5	N	195.0	770.4	68.1	10.6	5.4
6	GT Testing / DLN Tuning	8	0-50	1.0	13.9	1,091.3	1560.2	6163.1	544.6	86.9	28.5	N	195.0	770.4	68.1	10.6	5.4
7	GT Testing / DLN Tuning	8	50-75	1.0	18.3	1,652.2	1174.0	498.5	58.0	88.3	37.4	N	146.8	62.3	7.3	10.6	5.4
8	GT Testing / DLN Tuning	8	50-75	1.0	18.3	1,652.2	1174.0	498.5	58.0	88.3	37.4	N	146.8	62.3	7.3	10.6	5.4
9	GT Testing / DLN Tuning	8	75-100	1.0	22.4	2,214.8	1970.8	726.5	94.6	90.0	45.9	N	246.3	90.8	11.8	10.6	5.4
10	GT Testing / DLN Tuning	8	75-100	1.0	22.4	2,214.8	1970.8	726.5	94.6	90.0	45.9	N	246.3	90.8	11.8	10.6	5.4
11	No Operation	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	N					
12	Load Catalyst	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	N					
13	Load Catalyst	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	N					
14	Load Catalyst	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	N					
15	Load Catalyst	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	N					
16	GT Base Load / Commissioning of Ammonia system	16	50-100	1.0	43.3	4,355.6	457.4	680.5	147.3	174.8	88.7	Y	28.6	42.5	9.2	10.6	5.4
17	GT Load Test	12	100	1.0	32.9	3,285.2	362.8	588.4	121.0	132.4	67.3	Y	30.2	49.0	10.1	10.6	5.4
18	No Operation	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Y					
19	Install Emissions Test Equipment	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Y					
20	Emissions Tuning / Drift Test	12	50-100	1.0	32.9	3,285.2	362.8	588.4	121.0	132.4	67.3	Y	30.2	49.0	10.1	10.6	5.4
21	Emissions Tuning / Drift Test	12	50-100	1.0	32.9	3,285.2	362.8	588.4	121.0	132.4	67.3	Y	30.2	49.0	10.1	10.6	5.4
22	Pre-performance Testing / Drift Test	16	100	1.0	43.3	4,355.6	457.4	680.5	147.3	174.8	88.7	Y	28.6	42.5	9.2	10.6	5.4
23	Pre-performance Testing / Drift Test	16	100	1.0	43.5	4,386.6	469.4	616.5	140.3	174.8	89.2	Y	29.3	38.5	8.8	10.6	5.4
24	Pre-performance Testing / Drift Test	16	100	1.0	43.5	4,386.6	469.4	616.5	140.3	174.8	89.2	Y	29.3	38.5	8.8	10.6	5.4
25	RATA / Pre-performance Testing / Source Testing	16	100	1.0	43.3	4,355.6	457.4	680.5	147.3	174.8	88.7	Y	28.6	42.5	9.2	10.6	5.4
26	RATA / Pre-performance Testing / Source Testing	16	100	1.0	43.5	4,386.6	469.4	616.5	140.3	174.8	89.2	Y	29.3	38.5	8.8	10.6	5.4
27	Pre-performance Testing / Source Testing	16	100	1.0	43.5	4,386.6	469.4	616.5	140.3	174.8	89.2	Y	29.3	38.5	8.8	10.6	5.4
28	Pre-performance Testing / Source Testing	16	50-100	1.0	43.5	4,386.6	469.4	616.5	140.3	174.8	89.2	Y	29.3	38.5	8.8	10.6	5.4
29	Remove Emissions Test Equipment	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Y					
30	Torque Exhaust Bolts & Remove A179 Strainers	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Y					
31	Torque Exhaust Bolts & Remove A179 Strainers	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Y					
32	Torque Exhaust Bolts & Remove A179 Strainers	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Y					
33	Water Wash & Performance preparation	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Y					
34	Water Wash & Performance preparation	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Y					
35	Water Wash & Performance preparation	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Y					
36	Performance/Reliability Testing	24	100	0.0	64.4	6,525.3	654.5	655.7	167.9	258.1	131.8	Y	27.3	27.3	7.0	10.6	5.4
37	Performance/Reliability Testing	24	100	1.0	62.7	6,424.3	571.5	697.7	182.9	255.9	128.3	Y	23.8	29.1	7.6	10.6	5.4
38	No Operation	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Y					
39	SCE 72 Hour Test - Day 1	24	50-100	0.0	64.4	6,525.3	654.5	655.7	167.9	258.1	131.8	Y	27.3	27.3	7.0	10.6	5.4
40	SCE 72 Hour Test - Day 2	24	50-100	0.0	62.6	6,422.3	567.5	552.7	157.9	254.4	128.2	Y	23.6	23.0	6.6	10.6	5.4
41	SCE 72 Hour Test - Day 3	24	50-100	1.0	62.7	6,424.3	571.5	697.7	182.9	255.9	128.3	Y	23.8	29.1	7.6	10.6	5.4
	Total GT operation hours =	366					23,393.9	63,485.9	7,038.4	3,976.9	1,890.8	max =	246.3	1,973.0	164.1	10.6	5.4
							11.7	31.7	3.5	2.0	0.9						

Table C-2.5
Puente Power Project
Proposed New Emergency Generator Engine

Rating (bhp) =	779				
Fuel =	Diesel				
Fuel Consumption (gal/hr) =	35.9				
Exhaust Temperature (F) =	1263				
Exhaust Diameter (inches) =	6				
Exhaust Flow Rate (acfm) =	3,185				
Exhaust Velocity (ft/sec) =	270				
	NOx	**CO**	**ROC**	**PM10**	**SOx**
Emission Factor (g/bhp-hr)(1) =	0.50	2.61	0.14	0.02	0.00
Hourly Emissions (lbs/hr)(2) =	8.58E-01	4.48E+00	2.43E-01	3.84E-02	8.42E-03

Notes:
(1) Based on non-road Diesel EPA Tier 4 (final) certification standards for 2015 and new engine year standby generator sets (560 to 900 kw engines).
(2) Assumes testing at 100% load.

TABLE C-2.6a

DIESEL GENERATOR SET ENGINE SPECIFICATIONS

DIESEL GENERATOR SET

Image shown may not reflect actual package

Standby
500 ekW 625 kVA
60 Hz 1800 rpm 480 Volts

Caterpillar is leading the power generation Market place with Power Solutions engineered to deliver unmatched flexibility, expandability, reliability, and cost-effectiveness.

DESIGN CRITERIA
- The generator set accepts 100% rated load in one step per NFPA 110 and meets ISO 8528-5 transient response.

UL 2200
- UL 2200 packages available. Certain restrictions may apply. Consult with your Cat® dealer.

FULL RANGE OF ATTACHMENTS
- Wide range of bolt-on system expansion attachments, factory designed and tested
- Flexible packaging options for easy and cost effective installation

SINGLE-SOURCE SUPPLIER
- Fully prototype tested with certified torsional vibration analysis available

WORLDWIDE PRODUCT SUPPORT
- Cat dealers provide extensive post sale support including maintenance and repair agreements
- Cat dealers have over 1,800 dealer branch stores operating in 200 countries.
- The Caterpillar S•O•S℠ program effectively detects internal engine component condition, even the presence of unwanted fluids and combustion by products.

CAT® C15 ATAAC DIESEL ENGINE
- Reliable, rugged, durable design
- Field proven in thousands of applications worldwide
- Four-stroke diesel engine combines consistent performance and excellent fuel economy with minimum weight

CAT GENERATOR
- Matched to the performance and output characteristics of Cat engines
- Single point access to accessory connections
- UL 1446 Recognized Class H insulation

CAT EMCP 4 CONTROL PANELS
- Simple user friendly interface and navigation
- Scalable system to meet a wide range of customer needs
- Integrated Control System and Communications Gateway

STANDBY 500 ekW 625 kVA

60 Hz 1800 rpm 480 Volts

FACTORY INSTALLED STANDARD & OPTIONAL EQUIPMENT

System	Standard	Optional
Air Inlet	• Standard duty air filter	[ ] Air cleaner- Single stage canister style [ ] Heavy duty air filter- Single stage canister w/pre-cleaner
Cooling	• Radiator package mounted • Coolant drain line with valve. Drain hose terminated at edge • Fan and belt guards • Coolant level sight gauge • Cat Extended Life Coolant	[ ] Radiator duct flange (open set only) [ ] Radiator guard (open set only)
Exhaust	• Dry exhaust manifold • Male full V-band style flanged outlet • Stainless steel flex with female full V-band flange connections	[ ] Mufflers [ ] Male full V-band weld flange with V-band clamp
Fuel	• Primary fuel filter with integral water separator • Secondary fuel filters-spin on • Fuel priming pump • Flex fuel lines • Fuel cooler	[ ] 12 & 24 hour UL listed dual wall sub-base fuel tanks with low fuel level switch
Generator	• Brushless Exciter • Class H insulation • IP 23 Protection • VR6 voltage regulator with 3 phase sensing	[ ] Cat digital voltage regulator (Cat DVR) with reactive droop control [ ] Oversize harsh environment generators [ ] Permanent magnet excitation [ ] Anti-condensation space heaters
Power Termination	• Power termination strips mounted inside power center • Segregated low voltage wiring panel • Bottom entry	[ ] Circuit breakers, UL/EC listed, 3 pole [ ] Circuit breaker shunt trip [ ] Circuit breaker auxiliary contact
Governor	• ADEM™ A4	[ ] Load share module
Control Panel	• EMCP 4.2 (rear mounted) • Speed adjust • Emergency Stop Pushbutton • Voltage adjust	[ ] EMCP 4.4 [ ] Local annunciator modules (NFPA 99/110) [ ] Remote annunciator modules (NFPA 99/110) [ ] Discrete I/O module
Lube	• Lubricating oil and filter • Oil drain line with valves • Open crankcase ventilation (OCV) filter • Gear type lube oil pump	
Mounting	• Rails - engine / generator / radiator mounting • Rubber vibration isolator	
Starting / Charging	• 24 volt starting motor • Batteries with rack and cables (dry) • 45 amp charging alternator • Battery disconnect switch	[ ] Jacket water heater [ ] 10 Amp UL recognized battery charger
General	• Paint – Cat yellow except rails and radiators gloss black	[ ] UL 2200 listed [ ] CSA Certification

***Not included with packages without radiators**

STANDBY 500 ekW 625 kVA

60 Hz 1800 rpm 480 Volts

SPECIFICATIONS

CAT GENERATOR

Frame ……………………..…………………….. 6124F
Excitation …………………………………………..….IE
Pitch………………………………………………0.6667
Number of poles…………………………………….4
Number of leads……………………………………..12
Number of bearings ……………….……………Single
Insulation ………………………………………Class H
IP rating ………………………………..Drip proof IP23
Over speed capability - % of rated………………125%
Wave form deviation………………………………...2 %
Voltage regulator………… 3 phase sensing with load adjustable module
Voltage regulation….Less than ±1/2% (steady state)
Less than ±1/2% (3% speed change)
Telephone Influence Factor ……………Less than 50
Harmonic Distortion ……………………..Less than 5%

CAT DIESEL ENGINE

C15 ATAAC, L-6, 4 stroke, water-cooled diesel

Bore …………….……….…… ...137.20 mm (5.4 in)
Stroke ……………………………171.4 mm (6.75 in)
Displacement …………………...15.20 L (927.56 in^3)
Compression ratio…………..………………..16:1
Aspiration………………….…..….….………ATAAC
Fuel system……………………………….……..MEUI
Governor Type………………………….. ADEM™ A4

CAT EMCP 4 CONTROL PANELS

EMCP 4 controls including:
- Run / Auto / Stop Control
- Speed & Voltage Adjust
- Engine Cycle Crank
- Emergency stop pushbutton

EMCP 4.2 controller features:
- 24-volt DC operation
- Environmental sealed front face
- Text alarm/event descriptions

Digital indication for:
- RPM
- DC volts
- Operating hours
- Oil pressure (psi, kPa or bar)
- Coolant temperature
- Volts (L-L & L-N), frequency (Hz)
- Amps (per phase & average)
- Power Factor (per phase & average)
- kW (per phase, average & percent)
- kVA (per phase, average & percent)
- kVAr (per phase, average & percent)
- kW-hr & kVAr-hr (total)

Warning/shutdown with common LED indication of shutdowns for:
- Low oil pressure
- High coolant temperature
- Overspeed
- Emergency stop
- Failure to start (overcrank)
- Low coolant temperature
- Low coolant level

Programmable protective relaying functions:
- Generator phase sequence
- Over/Under voltage (27/59)
- Over/Under Frequency (81 o/u)
- Reverse Power (kW) (32)
- Reverse Reactive Power (kVAr) (32RV)
- Overcurrent (50/51)

Communications
- Customer data link (Modbus RTU)
- Accessory module data link
- Serial annunciator module data link

- 6 programmable digital inputs
- 4 programmable relay outputs (Form A)
- 2 programmable relay outputs (Form C)
- 2 programmable digital outputs

Compatible with the following optional modules:
- Digital I/O module
- Local Annunciator
- Remote annunciator
- RTD module
- Thermocouple module

STANDBY 500 ekW 625 kVA
60 Hz 1800 rpm 480 Volts

TECHNICAL DATA

Open Generator Set - 1800 rpm/60 Hz/480 Volts	STANDBY EM0177	
Genset Package Performance		
Power rating @ 0.8 pf	625 kVA	
Power rating w/fan	500 ekW	
Fuel Consumption[1]		
100% load with fan	136.6 L/hr	35.9 Gal/hr
75% load with fan	108.0 L/hr	28.6 Gal/hr
50% load with fan	78.0 L/hr	20.5 Gal/hr
Cooling System[2]		
Ambient air temperature	51°C	123 °F
Air flow restriction (system)	0.12 kPa	0.5 in water
Air flow (max @rated speed)	819.6 m^3/min	28958 cfm
Engine coolant Capacity with radiator arrangement)	68 L	18.0 US Gal
Engine coolant capacity	27 L	7.1 US Gal
Radiator coolant capacity	41 L	10.9 US Gal
Inlet Air		
Combustion air inlet flow rate	35.2 m^3/min	1243 cfm
Exhaust System		
Exhaust stack gas temperature	683.8 °C	1263 °F
Exhaust gas flow rate	90.2 m^3/min	3185 cfm
Exhaust flange size (internal diameter)	139 mm	5.5 in
Exhaust system backpressure (minimum allowable) [3]	1 kPa	4 in. water
Exhaust system backpressure (maximum allowable) [3]	10 kPa	40 in. water
Heat Rejection		
Heat rejection to coolant (total)	253 kW	14375 Btu/min
Heat rejection to exhaust (total)	430 kW	24457 Btu/min
Heat rejection to atmosphere from engine	95.6 kW	5436 Btu/min
Heat rejection to atmosphere from generator	29.1 kW	1655 Btu/min
Alternator[4]		
Motor starting capability @ 30% voltage dip	1712 skVA	
Frame	LC6124F	
Temperature Rise	130°C	234°F
Lube System [5]		
Lube oil refill with filter change for standard sump	60 L	15.9 US Gal

RATING DEFINITIONS AND CONDITIONS

Meets or Exceeds International Specifications: · AS1359, CSA, IEC60034-1, ISO3046, ISO8528, NEMA MG 1-22, NEMA MG 1-33, UL508A, 72/23/EEC, 98/37/EC, 2004/108/EC

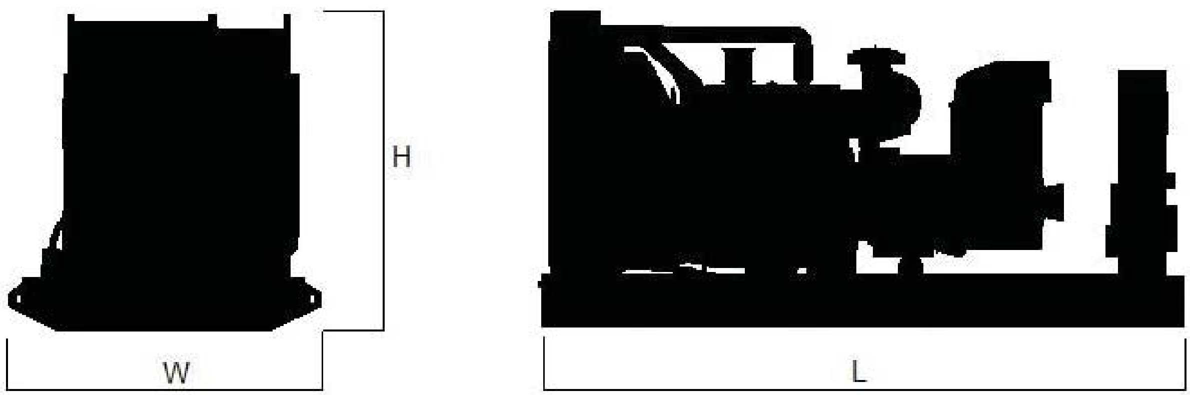
Standby - Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year. Standby power in accordance with ISO8528. Fuel stop power in accordance with ISO3046. Standby ambients shown indicate ambient temperature at 100% load which results in a coolant top tank temperature just below the shutdown temperature.

Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions

Fuel Rates are based on fuel oil of 35º API [16º C (60º F)] gravity having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 29º C (85º F) and weighing 838.9 g/liter (7.001 lbs/U.S. gal.). Additional ratings may be available for specific customer requirements, contact your Cat representative for details. For information regarding Low Sulfur fuel and Biodiesel capability, please consult your Cat dealer.

DIMENSIONS

Package Dimensions		
Length	4273 mm	169 in
Width	2058 mm	81 in
Height	2092 mm	83 in
Weight	3759 kg	8288 lb



www.Cat-ElectricPower.com

Performance No.: EM0177

Feature Code: C15DEBH

Gen. Arr. Number: 235-1212

Sourced: U.S. Sourced

LEHE0305-01 (06/11)

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TABLE C-2.6b

EPA EMISSION STANDARDS REFERENCE GUIDE FOR NONROAD COMPRESSION IGNITION ENGINES EXHAUST EMISSION STANDARDS

EPA United States Environmental Protection Agency

Emission Standards Reference Guide

Nonroad Compression-Ignition Engines -- Exhaust Emission Standards

	Rated Power (kW)	Tier	Model Year	NMHC (g/kW-hr)	NMHC + NOx (g/kW-hr)	NOx (g/kW-hr)	PM (g/kW-hr)	CO (g/kW-hr)	Smoke[a] (Percentage)	Useful Life (hours /years)[b]	Warranty Period (hours /years)[b]
Federal	kW < 8	1	2000-2004	-	10.5	-	1.0	8.0	20/15/50	3,000/5	1,500/2
		2	2005-2007	-	7.5	-	0.80	8.0			
		4	2008+	-	7.5	-	0.40[c]	8.0			
	8 ≤ kW < 19	1	2000-2004	-	9.5	-	0.80	6.6		3,000/5	1,500/2
		2	2005-2007	-	7.5	-	0.80	6.6			
		4	2008+	-	7.5	-	0.40	6.6			
	19 ≤ kW < 37	1	1999-2003	-	9.5	-	0.80	5.5		5,000/7[d]	3,000/5[e]
		2	2004-2007	-	7.5	-	0.60	5.5			
		4	2008-2012	-	7.5	-	0.30	5.5			
			2013+	-	4.7	-	0.03	5.5			
	37 ≤ kW < 56	1	1998-2003	-	-	9.2	-	-		8,000/10	3,000/5
		2	2004-2007	-	7.5	-	0.40	5.0			
		3[f]	2008-2011	-	4.7	-	0.40	5.0			
		4 (Option 1)[g]	2008-2012	-	4.7	-	0.30	5.0			
		4 (Option 2)[g]	2012	-	4.7	-	0.03	5.0			
		4	2013+	-	4.7	-	0.03	5.0			
	56 ≤ kW < 75	1	1998-2003	-	-	9.2	-	-			
		2	2004-2007	-	7.5	-	0.40	5.0			
		3	2008-2011	-	4.7	-	0.40	5.0			
		4	2012-2013[h]	-	4.7	-	0.02	5.0			
			2014+[i]	0.19	-	0.40	0.02	5.0			
	75 ≤ kW < 130	1	1997-2002	-	-	9.2	-	-			
		2	2003-2006	-	6.6	-	0.30	5.0			
		3	2007-2011	-	4.0	-	0.30	5.0			
		4	2012-2013[h]	-	4.0	-	0.02	5.0			
			2014+	0.19	-	0.40	0.02	5.0			
	130 ≤ kW < 225	1	1996-2002	1.3[j]	-	9.2	0.54	11.4			
		2	2003-2005	-	6.6	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013[h]	-	4.0	-	0.02	3.5			
			2014+[i]	0.19	-	0.40	0.02	3.5			
	225 ≤ kW < 450	1	1996-2000	1.3[j]	-	9.2	0.54	11.4			
		2	2001-2005	-	6.4	-	0.20	3.5			

		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013[h]	-	4.0	-	0.02	3.5			
			2014+[i]	0.19	-	0.40	0.02	3.5			
	450 ≤ kW < 560	1	1996-2001	1.3[j]	-	9.2	0.54	11.4			
		2	2002-2005	-	6.4	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013[h]	-	4.0	-	0.02	3.5			
			2014+[i]	0.19	-	0.40	0.02	3.5			
	560 ≤ kW < 900	1	2000-2005	1.3[j]	-	9.2	0.54	11.4			
		2	2006-2010	-	6.4	-	0.20	3.5			
		4	2011-2014	0.40	-	3.5	0.10	3.5			
			2015+[i]	0.19	-	3.5[k]	0.04[l]	3.5			
	kW > 900	1	2000-2005	1.3[j]	-	9.2	0.54	11.4			
		2	2006-2010	-	6.4	-	0.20	3.5			
		4	2011-2014	0.40	-	3.5[k]	0.10	3.5			
			2015+[i]	0.19	-	3.5[k]	0.04[l]	3.5			

Notes:

- For Tier 1, 2, and 3 standards, exhaust emissions of nitrogen oxides (NOx), carbon monoxide (CO), hydrocarbons (HC), and non-methane hydrocarbons (NMHC) are measured using the procedures in 40 Code of Federal Regulations (CFR) Part 89 Subpart E. For Tier 1, 2, and 3 standards, particulate matter (PM) exhaust emissions are measured using the California Regulations for New 1996 and Later Heavy-Duty Off-Road Diesel Cycle Engines.

- For Tier 4 standards, engines are tested for transient and steady-state exhaust emissions using the procedures in 40 CFR Part 1039 Subpart F. Transient standards do not apply to engines below 37 kilowatts (kW) before the 2013 model year, constant-speed engines, engines certified to Option 1, and engines above 560 kW.

- Tier 2 and later model naturally aspirated nonroad engines shall not discharge crankcase emissions into the atmosphere unless these emissions are permanently routed into the exhaust. This prohibition does not apply to engines using turbochargers, pumps, blowers, or superchargers.

- In lieu of the Tier 1, 2, and 3 standards for NOX, NMHC + NOX, and PM, manufacturers may elect to participate in the averaging, banking, and trading (ABT) program described in 40 CFR Part 89 Subpart C.

a Smoke emissions may not exceed 20 percent during the acceleration mode, 15 percent during the lugging mode, and 50 percent during the peaks in either mode. Smoke emission standards do not apply to single-cylinder engines, constant-speed engines, or engines certified to a PM emission standard of 0.07 grams per kilowatt-hour (g/kW-hr) or lower. Smoke emissions are measured using procedures in 40 CFR Part 86 Subpart I.

b Useful life and warranty period are expressed hours and years, whichever comes first.

c Hand-startable air-cooled direct injection engines may optionally meet a PM standard of 0.60 g/kW-hr. These engines may optionally meet Tier 2 standards through the 2009 model years. In 2010 these engines are required to meet a PM standard of 0.60 g/kW-hr.

d Useful life for constant speed engines with rated speed 3,000 revolutions per minute (rpm) or higher is 5 years or 3,000 hours, whichever comes first.

e Warranty period for constant speed engines with rated speed 3,000 rpm or higher is 2 years or 1,500 hours, whichever comes first.

f These Tier 3 standards apply only to manufacturers selecting Tier 4 Option 2. Manufacturers selecting Tier 4 Option 1 will be meeting those standards in lieu of Tier 3 standards.

g A manufacturer may certify all their engines to either Option 1 or Option 2 sets of standards starting in the indicated model year. Manufacturers selecting Option 2 must meet Tier 3 standards in the 2008-2011 model years.

h These standards are phase-out standards. Not more than 50 percent of a manufacturer's engine production is allowed to meet these standards in each model year of the phase out period. Engines not meeting these standards must meet the final Tier 4 standards.

i These standards are phased in during the indicated years. At least 50 percent of a manufacturer's engine production must meet these standards during each year of the phase in. Engines not meeting these standards must meet the applicable phase-out standards.

j For Tier 1 engines the standard is for total hydrocarbons.

k The NOx standard for generator sets is 0.67 g/kW-hr.

l The PM standard for generator sets is 0.03 g/kW-hr.

Code of Federal Regulations (CFR) Citations:

- 40 CFR 89.112 = Exhaust emission standards
- 40 CFR 1039.101 = Exhaust emission standards for after 2014 model year
- 40 CFR 1039.102 = Exhaust emission standards for model year 2014 and earlier
- 40 CFR 1039 Subpart F = Exhaust emissions transient and steady state test procedures
- 40 CFR 86 Subpart I = Smoke emission test procedures
- 40 CFR 1065 = Test equipment and emissions measurement procedures

Last updated on Wednesday, March 06, 2013

Table C-2.7
Puente Power Project
Natural Gas Compressor Fugitive Emissions (one new fuel compressor)

Fitting	Number	Emission factor (kg/hr/unit)(1)	Organic Compound Emissions (kg/hr)	Organic Compound Emissions (lb/day)	ROC Emissions(2) (lb/day)	CH4 Emissions(3) (lb/day)
Valves	50	4.50E-03	0.225	2.45	0.23	2.36
Connectors	112	2.00E-04	0.0224	0.24	0.02	0.24
Compressor Seals	1	8.80E-03	0.0088	0.10	0.01	0.09
TOTAL =				2.79	0.26	2.69

Notes:
(1) EPA's Protocol for Equipment Leak Emission Estimates, November 1995, Table 2-4 (Oil and Gas Production Operations).
(2) Based on a VOC fraction of total organic compound of 9.46%wt (based on gas composition specified by SDAPCD for Pio Pico Energy Center with high VOC due to LNG).
(3) Based on CH4 fraction (96.57%wt) of site specific gas composition.

Table C-2.8
Puente Power Project
Hourly Emissions

Hourly Mass Emission Rates, lbs/hr (Commissioning Period)						
	NOx	CO	ROC	PM10	SOx	NH3(1)
New GT Normal Operation	23.36	22.76	6.52	10.60	5.44	17.17
New GT Startups	98.68	178.38	20.26	9.00	5.44	17.17
New GT Shutdowns	22.69	163.21	30.21	9.98	5.44	17.17
New GT Startup/Shutdown/Restart	143.20	412.20	52.20	7.42	5.44	17.17
New GT Commissioning	246.35	1972.96	164.12	10.60	5.44	17.17
New GT Maximum =	246.35	1972.96	164.12	10.60	5.44	17.17
New Emergency Generator Engine	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A
New Natural Gas Compressor	N/A	N/A	0.01	N/A	N/A	N/A
Existing Unit 3(3)	1104.41	276.10	18.07	48.53	1.43	
Total New Equipment =	**246.35**	**1972.96**	**164.13**	**10.60**	**5.44**	**17.17**
Total Emergency Engine =	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A
Total Entire Facility =	**1350.76**	**2249.06**	**182.20**	**59.13**	**6.87**	**17.17**

Hourly Mass Emission Rates, lbs/hr (Non-Commissioning Period)						
	NOx	CO	ROC	PM10	SOx	NH3(1)
New GT Normal Operation	23.36	22.76	6.52	10.60	5.44	17.17
New GT Startups	98.68	178.38	20.26	9.00	5.44	17.17
New GT Shutdowns	22.69	163.21	30.21	9.98	5.44	17.17
New GT Startup/Shutdown/Restart	143.20	412.20	52.20	7.42	5.44	17.17
New GT Maximum =	143.20	412.20	52.20	10.60	5.44	17.17
New Emergency Generator Engine	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A
New Natural Gas Compressor	N/A	N/A	0.01	N/A	N/A	N/A
Existing Unit 3(3)	1104.41	276.10	18.07	48.53	1.43	
Total New Equipment =	**143.20**	**412.20**	**52.21**	**10.60**	**5.44**	**17.17**
Total Emergency Engine =	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A(2)	N/A
Total Entire Facility =	1247.61	688.30	70.28	59.13	6.87	17.17

Notes:
(1) Set startup/shutdown hourly emission rate to 100% load normal emission level to determine worst case hourly emissions for AQ modeling purposes.
(2) Emergency engine will not be operated during commissioning testing of new gas turbine and/or during startups/shutdowns of new gas turbine.
(3) Based on hourly emission limits in Title V permit for this unit.

Table C-2.9
Puente Power Project
Daily Emissions

Daily Emission Rates, lbs/day (Commissioning Period)

	Operating	Hourly Emission Rate (lbs/hr)						Daily Emissions (lbs/day)					
	Hours	NOx	CO	ROC	PM10	SOx	NH3	NOx	CO	ROC	PM10	SOx	NH3
New GT Normal Operation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
New GT Startups	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
New GT Shutdowns	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
New GT Commissioning	various	various	various	various	various	various	various	23,393.9	0.0	0.0	254.4	59.7	412.1
New GT Total =								**23,393.9**	**0.0**	**0.0**	**254.4**	**59.7**	**412.1**
New Emergency Generator Engine	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
New Natural Gas Compressor	24									0.3			
Existing Unit 3(2)	10	1104.41	276.10	18.07	48.53	1.43	0.00	11044.10	2761.00	180.70	485.30	14.30	0.00
Total New Equipment =								**23,393.9**	**0.0**	**0.3**	**254.4**	**59.7**	**412.1**
Total Emergency Engine =								N/A	N/A	N/A	N/A	N/A	N/A
Total Entire Facility =								**34,438.0**	**2,761.0**	**181.0**	**739.7**	**74.0**	**412.1**

Daily Emission Rates, lbs/day (Non-Commissioning Period)

	Operating	Hourly Emission Rate (lbs/hr)						Daily Emissions (lbs/day)					
	Hours	NOx	CO	ROC	PM10	SOx(1)	NH3(1)	NOx	CO	ROC	PM10	SOx	NH3
New GT Normal Operation	16	23.36	22.76	6.52	10.60	5.44	17.17	373.8	364.2	104.3	169.6	87.1	274.7
New GT Startups	4	98.68	178.38	20.26	9.00	5.44	17.17	394.7	713.5	81.0	36.0	21.8	68.7
New GT Shutdowns	4	22.69	163.21	30.21	9.98	5.44	17.17	90.8	652.8	120.9	39.9	21.8	68.7
New GT Total =								**859.2**	**1730.5**	**306.1**	**245.5**	**130.6**	**412.1**
New Emergency Generator Engine	1	0.86	4.48	0.24	0.04	0.01		0.9	4.5	0.2	0.0	0.0	
New Natural Gas Compressor	24									0.3			
Existing Unit 3(2)	10	1104.41	276.10	18.07	48.53	1.43		11044.1	2761.0	180.7	485.3	14.3	
Total New Equipment =								**860.1**	**1,735.0**	**306.6**	**245.6**	**130.6**	**412.1**
Total Emergency Engine =								**0.9**	**4.5**	**0.2**	**0.0**	**0.0**	
Total Entire Facility =								**11904.2**	**4496.0**	**487.3**	**730.9**	**144.9**	**412.1**

Notes:
(1) Set startup/shutdown hourly emission rate to 100% load normal emission level to determine worst case daily emissions for AQ modeling purposes.
(2) Based on maximum number of actual hours of operation per day during period from 2010 to 2014 and Title V hourly emission limits for this unit.

Table C-2.10
Puente Power Project
Annual Emissions - Commissioning Year

	Hours per Year	NOx (lbs/hr)	CO (lbs/hr)	ROC (lbs/hr)	PM10 (lbs/hr)	SOx(1) (lbs/hr)	NH3(1) (lbs/hr)	NOx (lbs/year)	CO (lbs/year)	ROC (lbs/year)	PM10 (lbs/year)	SOx (lbs/year)	NH3 (lbs/year)
New GT Commissioning	366	various	various	various	various	various	17.17	23,394	63,486	7,038	3,977	1,891	6,284
New GT Start-Up	200	98.68	178.38	20.26	9.00	1.81	17.17	19,736	35,676	4,052	1,800	361	3,434
New GT Normal Operation	1,030	23.26	22.66	6.49	10.60	1.81	17.17	23,958	23,340	6,684	10,918	1,860	17,685
New GT Shutdown	200	22.69	163.21	30.21	9.98	1.81	17.17	4,538	32,642	6,043	1,996	361	3,434
New GT Total =	**1,796**							**71,625**	**155,143**	**23,816**	**18,691**	**4,473**	**30,837**
New Emergency Generator Engine	200	0.86	4.48	0.24	0.04	0.01	0.00	172	896	49	8	2	
New Natural Gas Compressor										96			
Existing Unit 3(2)								4,119	10,228	669	1,798	53	n/a
Total New Equipment Annual Emissions (lb/year) =								**71,797**	**156,040**	**23,961**	**18,699**	**4,475**	**30,837**
Total New Equipment Annual Emissions (tons/year) =								**35.9**	**78.0**	**12.0**	**9.3**	**2.2**	**15.4**
Total New Gas Turbine Annual Emissions (tons/year) =								**35.8**	**77.6**	**11.9**	**9.3**	**2.2**	**15.4**
Total New Emergency Engine Annual Emissions (tons/year) =								**0.1**	**0.4**	**0.0**	**0.0**	**0.0**	**0.0**
Total New Gas Compressor Annual Emissions (tons/year) =										**0.0**			
Total Entire Facility Annual Emissions (tons/year) =								**38.0**	**83.1**	**12.3**	**10.2**	**2.3**	**15.4**

Notes:

(1) Set hourly startup/shutdown emission rate to 100% load normal emission level to determine worst case annual emissions for AQ modeling purposes.

(2) Based on 2-year average of actual annual emissions during 2012 and 2013.

Table C-2.11
Puente Power Project
Annual Emissions - Non-Commissioning Year

	Hours per Year	NOx (lbs/hr)	CO (lbs/hr)	ROC (lbs/hr)	PM10 (lbs/hr)	SOx(1) (lbs/hr)	NH3(1) (lbs/hr)	NOx (lbs/year)	CO (lbs/year)	ROC (lbs/year)	PM10 (lbs/year)	SOx (lbs/year)	NH3 (lbs/year)
New GT Start-Up	200	98.68	178.38	20.26	9.00	1.81	17.17	19,736	35,676	4,052	1,800	361	3,434
New GT Normal Operation	2,053	23.26	22.66	6.49	10.60	1.81	17.17	47,753	46,521	13,322	21,762	3,708	35,250
New GT Shutdown	200	22.69	163.21	30.21	9.98	1.81	17.17	4,538	32,642	6,043	1,996	361	3,434
New GT Total =	**2,453**							**72,026**	**114,839**	**23,416**	**25,558**	**4,430**	**42,118**
New Emergency Generator Engine	200	0.86	4.48	0.24	0.04	0.01		172	896	49	8	2	
New Natural Gas Compressor										96			
Existing Unit 3(2)								4,119	10,228	669	1,798	53	n/a
Total New Equipment Annual Emissions (lb/year) =								**72,198**	**115,735**	**23,561**	**25,565**	**4,432**	**42,118**
Total New Equipment Annual Emissions (tons/year) =								**36.1**	**57.9**	**11.8**	**12.8**	**2.2**	**21.1**
Total New Gas Turbine Annual Emissions (tons/year) =								**36.0**	**57.4**	**11.7**	**12.8**	**2.2**	**21.1**
Total New Emergency Engine Annual Emissions (tons/year) =								**0.1**	**0.4**	**0.0**	**0.0**	**0.0**	
Total New Gas Compressor Annual Emissions (tons/year) =										**0.0**			
Total Entire Facility Annual Emissions (tons/year) =								**38.2**	**63.0**	**12.1**	**13.7**	**2.2**	**21.1**

Notes:
(1) Set hourly startup/shutdown emission rate to 100% load normal emission level to determine worst case annual emissions for AQ modeling purposes.
(2) Based on 2-year average of actual annual emissions during 2012 and 2013.

Table C-2.12
Puente Power Project
Hourly Emissions for Existing Units 1-3

Device	Unit 1	Unit 2	Unit 3 Gas Turbine
Fuel	Natural Gas	Natural Gas	Natural Gas
Maximum Power Rating (MW)	215	215	130
Maximum Heat Input (MMBtu/hr)	1900	1900	2510
Natural Gas F-factor (dscf/MMBtu)	8710	8710	8710
Natural Gas F-factor (wscf/MMBtu)	10610	10610	10610
Reference O2	3.0%	3.0%	15.0%
Actual O2	8.0%	6.6%	16.9%
Exhaust Temperature (F)	194	181	712
Exhaust Rate (dscfm @ ref. O2)	322,043	322,043	1,290,729
Exhaust Rate (wacfm @ actual O2)	673,202	595,313	5,122,144

	Emission Factors					
Pollutant	NOx (lb/MMscf)	CO (lb/MMscf)	ROC (lb/MMscf)	PM10 (lb/MMscf)	SOx (lb/MMscf)	NH3 (lb/MMscf)
Unit 1[1]	3.42	40.00	1.40	2.50	0.60	--
Unit 2[1]	4.68	40.00	1.40	2.50	0.60	--
Unit 3 Gas Turbine[2]	462.00	115.50	7.56	20.30	0.60	n/a

	Hourly Emissions[3]					
Unit	NOx (lbs/hr)	CO (lbs/hr)	ROC (lbs/hr)	PM10 (lbs/hr)	SOx (lbs/hr)	NH3 (lbs/hr)[4]
Unit 1	6.35	75.81	2.66	4.74	1.14	8.91
Unit 2	8.71	75.81	2.66	4.74	1.14	8.91
Unit 3 Gas Turbine	1104.41	276.10	18.07	48.53	1.43	n/a

Notes:
1. For NOx , based on a 2-Year average of CEMS data 2012 to 2013. CO, ROC, Sox, PM10 emission factors based on VCAPCD inventory factors.
2. Nox, CO, ROC, Sox, and PM10 emissions factors based on VCAPCD inventory factors.
3. Hourly emissions based on emission factors and maximum hourly heat input.
4. NH3 emissions based on Title V emission limits.

Table C-2.13a: Mandalay Generating Station - Baseline NOx emissions (tons/year)

	2009	2010	2011	2012	2013	2014
U1	1.15	0.55	0.29	1.97	1.79	1.67
U2	3.32	1.40	0.40	2.77	3.30	1.92
U3	2.08	0.99	0.71	2.55	1.57	0.51
Total =	6.55	2.94	1.39	7.29	6.66	4.09
Total Units 1 + 2 =	4.47	1.95	0.68	4.75	5.09	3.58
2-Year Average (all) =		4.74	2.16	4.34	6.98	5.38
2-Yr Avg. Units 1 + 2 =		3.21	1.32	2.71	4.92	4.34
2-Yr Avg. Unit 1 =		0.85	0.42	1.13	1.88	1.73
2-Yr Avg. Unit 2 =		2.36	0.90	1.59	3.04	2.61
2-Yr Avg. Unit 3 =		1.53	0.85	1.63	2.06	1.04

Notes:
1. Units 1 and 2 based on hourly CEMS data.
2. Unit 3 based on VCAPCD emission inventories (2014 based on fuel use and VCAPCD emission factor)

Table C-2.13b: Mandalay Generating Station - Baseline CO emissions (tons/year)

	2009	2010	2011	2012	2013	2014
U1	32.61	6.29	6.68	22.80	21.26	15.37
U2	33.81	11.75	10.16	23.31	28.58	16.95
U3	5.16	2.45	1.76	6.33	3.90	1.26
Total =	71.57	20.49	18.60	52.44	53.74	33.58
Total Units 1 + 2 =	66.42	18.04	16.84	46.11	49.84	32.32
2-Year Average (all) =		46.03	19.54	35.52	53.09	43.66
2-Yr Avg. Units 1 + 2 =		42.23	17.44	31.48	47.98	41.08
2-Yr Avg. Unit 1 =		19.45	6.49	14.74	22.03	18.32
2-Yr Avg. Unit 2 =		22.78	10.95	16.73	25.95	22.76
2-Yr Avg. Unit 3 =		3.80	2.10	4.04	5.11	2.58

Notes:
1. 2009 to 2013 based on VCAPCD emission inventories.
2. 2014 based on fuel use and VCAPCD emission factors.

Table C-2.13c: Mandalay Generating Station - Baseline ROC emissions (tons/year)

	2009	2010	2011	2012	2013	2014
U1	1.14	0.22	0.23	0.80	0.74	0.54
U2	1.18	0.41	0.36	0.82	1.00	0.59
U3	0.34	0.16	0.11	0.41	0.26	0.08
Total =	2.66	0.79	0.70	2.03	2.00	1.21
Total Units 1 + 2 =	2.32	0.63	0.59	1.61	1.74	1.13
2-Year Average (all) =		1.73	0.75	1.37	2.01	1.61
2-Yr Avg. Units 1 + 2 =		1.48	0.61	1.10	1.68	1.44
2-Yr Avg. Unit 1 =		0.68	0.23	0.52	0.77	0.64
2-Yr Avg. Unit 2 =		0.80	0.38	0.59	0.91	0.80
2-Yr Avg. Unit 3 =		0.25	0.14	0.26	0.33	0.17

Notes:
1. 2009 to 2013 based on VCAPCD emission inventories.
2. 2014 based on fuel use and VCAPCD emission factors.

Table C-2.13d: Mandalay Generating Station - Baseline SOx emissions (tons/year)

	2009	2010	2011	2012	2013	2014
U1	0.49	0.09	0.10	0.34	0.32	0.23
U2	0.51	0.18	0.15	0.35	0.43	0.25
U3	0.03	0.01	0.01	0.03	0.02	0.01
Total =	1.02	0.28	0.26	0.72	0.77	0.49
Total Units 1 + 2 =	1.00	0.27	0.25	0.69	0.75	0.48
2-Year Average (all) =		0.65	0.27	0.49	0.75	0.63
2-Yr Avg. Units 1 + 2 =		0.63	0.26	0.47	0.72	0.62
2-Yr Avg. Unit 1 =		0.29	0.10	0.22	0.33	0.27
2-Yr Avg. Unit 2 =		0.34	0.16	0.25	0.39	0.34
2-Yr Avg. Unit 3 =		0.02	0.01	0.02	0.03	0.01

Notes:
1. 2009 to 2013 based on VCAPCD emission inventories.
2. 2014 based on fuel use and VCAPCD emission factors.

Table C-2.13e: Mandalay Generating Station - Baseline PM10 emissions (tons/year)

	2009	2010	2011	2012	2013	2014
U1	2.04	0.39	0.42	1.43	1.33	0.96
U2	2.11	0.73	0.63	1.46	1.79	1.06
U3	0.91	0.43	0.31	1.11	0.69	0.22
Total =	5.06	1.56	1.36	3.99	3.80	2.24
Total Units 1 + 2 =	4.15	1.13	1.05	2.88	3.12	2.02
2-Year Average (all) =		3.31	1.46	2.68	3.90	3.02
2-Yr Avg. Units 1 + 2 =		2.64	1.09	1.97	3.00	2.57
2-Yr Avg. Unit 1 =		1.22	0.41	0.92	1.38	1.14
2-Yr Avg. Unit 2 =		1.42	0.68	1.05	1.62	1.42
2-Yr Avg. Unit 3 =		0.67	0.37	0.71	0.90	0.45

Notes:
1. 2009 to 2013 based on VCAPCD emission inventories.
2. 2014 based on fuel use and VCAPCD emission factors.

Table C-2.13f: Mandalay Generating Station - Fuel Use (MMSCF)

		2009	2010	2011	2012	2013	2014
U1	Natural Gas	1630.4	314.3	334.2	1140.2	1063.2	768.6
U2	Natural Gas	1690.4	587.6	507.8	1165.5	1429.0	847.5
U3	Natural Gas	89.3	42.4	30.4	109.6	67.5	21.8
Total (all) =		3410.1	944.3	872.4	2415.3	2559.7	1637.9
Total Units 1 + 2 =		3320.8	901.9	842.0	2305.7	2492.2	1616.0
2-Year Average (all) =			2177.20	908.35	1643.85	2487.50	2098.79
2-Yr Avg. Units 1 + 2 =			2111.35	871.95	1573.85	2398.95	2054.12
2-Yr Avg. Unit 1 =			972.35	324.25	737.20	1101.70	915.89
2-Yr Avg. Unit 2 =			1139.00	547.70	836.65	1297.25	1138.23
2-Yr Avg. Unit 3 =			65.85	36.40	70.00	88.55	44.67

Notes:
1. 2009 to 2013 based on VCAPCD emission inventory fuel use values.
2. 2014 based on fuel use data collected by the power plant.

Table C-2.14
Puente Power Project
Net Emission Changes For PSD Applicability Purposes
Based on Representative 2-year Average during Past 5 Years

	Emissions (tons/year)					
	NOx Emissions	CO Emissions	ROC Emissions	PM10 Emissions	PM2.5 Emissions	SOx Emissions
Emissions New Equipment =	36.1	57.9	11.8	12.8	12.8	2.2
Emission Reductions Units 1 and 2[1] =	4.9	48.0	1.7	3.0	3.0	0.7
Net Emission Change =	31.2	9.9	10.1	9.8	9.8	1.5
Major Modification Thresholds[1] =	40	100	40	15	10	40
Major Modification?	no	no	no	no	no	no
Triggers PSD?	no	no	no	no	no	no

Notes:

1. Based on representative two-year average (2012 to 2013) emissions during the past 5-years (see 40 CFR 52.21.b.21.i).
2. Based on 40 CFR 52.21.b.2.i and 40 CFR 52.21.b.23.i.

Table C-2.15
Puente Power Project
Net Emission Changes For NSR Applicability Purposes

	Emissions (tons/year)					
	NOx Emissions	CO Emissions	ROC Emissions	PM10 Emissions	PM2.5 Emissions	SOx Emissions
To Determine If Project is a Major Modification Under NSR Regulations						
Emissions New Equipment =	36.1	57.9	11.8	12.8	N/A	2.2
Emission Reductions Units 1 and 2[1] =	4.9	48.0	1.7	3.0	N/A	0.7
Net Emission Change =	31.2	9.9	10.1	9.8	N/A	1.5
Major Modification Thresholds[2] =	25	N/A	25	N/A	N/A	N/A
Major Modification?	Yes	N/A	No	N/A	N/A	N/A
To Determine ERC Requirements Under NSR Regulations (Using Replacement Emission Unit Approach)						
Emissions New GT =	36.0	57.4	11.7	12.8	N/A	2.2
Emission Reductions Units 1 and 2[3] =	4.9	644.4	23.2	41.5	N/A	10.0
Net Emission Change GT[4] =	31.1	-587.0	-11.5	-28.7	N/A	-7.7
Emissions New Emergency Generator Engine =	0.09	0.45	0.02	0.00	N/A	0.00
Emission Reductions Existing Generator Engine5 =	0.00	0.12	0.01	0.00	N/A	0.00
Net Emission Change Engine[4] =	0.08	0.33	0.02	0.00	N/A	0.00
Facility-Wide Net Emission Change =	31.2	-586.7	-11.5	-28.7	N/A	-7.7
Is There An Emissions Increase?	Yes	N/A	No	No	N/A	No
ERC Requirement Triggered?	Yes	N/A	No	No	N/A	No
Offset Ratio6 =	1.3	N/A	N/A	N/A	N/A	N/A
ERCs Required =	40.5	N/A	N/A	N/A	N/A	N/A
ERCs Controlled by Applicant =	52.7	N/A	N/A	N/A	N/A	N/A
Surplus/Shortfall =	-12.2	N/A	N/A	N/A	N/A	N/A

Notes:
1. Based on representative two-year average (2012 to 2013) emissions during the past 5-years.
2. Based on VCAPCD Rule 26.1.
3. For NOx, based on representative two-year average (2012 to 2013) emissions during the past 5-years. For CO, ROC, SOx, PM10 based on PTE levels using Title V permit annual emission limits with CO PTE corrected to a BACT level of 50 ppm @ 3% O2 (other pollutants meet current BACT levels).
4. VCAPCD Rule 26.6(D)(2) -for CO, SOx, and PM 10 emission increases for a replacement emissions unit calculated as the emissions unit's post-project potential to emit (adjusted to reflect current BACT) minus the emissions unit's pre-project potential to emit (adjusted to reflect current BACT). Because the project is a major modification for NOx, the NOx emission increase is calculated as the emissions unit's post-project potential to emit minus the unit pre-project actual emissions (per VCAPCD Rule 26.6(D)(7)(a)).
5. For NOx based on representative two-year average (2012 to 2013) emissions during the past 5-years. For CO, ROC, SOx, PM10 based on PTE corrected to current BACT levels assuming 200 hrs/year of operation (all types of operating including testing).
6. Per VCAPCD Rule 26.2(B)(2)(a).

Table C-2.16
Puente Power Project
Greenhouse Gas Emissions Calculations

Unit	Total Number of Units	Per Unit Heat Input (MMBtu/hr)	Per Unit Gross Output (MW)	Operating Hours per year	Annual Fuel Use (MMBtu/yr)	Estimated Annual Gross MWh	Maximum Emissions, metric tonnes/yr				Facility-Wide Emissions, MT/yr CO2e	Facility-Wide Emissions, tons/yr CO2e	New GT CO2 MT/MWh	New GT CO2 lbs/MWh
							CO2	CH4	N2O	SF6				
New Gas Turbine	1	2,579	278.0	2,453	6,326,518	681,934	335,685	6	1	--				
New Emergency Generator Engine	1	4.9		200	976	n/a	72	0	0	--				
Existing Unit 3 Gas Turbine	1	2,510			90,450	n/a	4,799	0	0	--				
New circuit breakers	2	--		8760	0	n/a	--	--	--	4.2E-04				
Total =				--	6,417,945	681,934	340,557	6	1	4.2E-04				
CO2-Equivalent =							340,557	160	191	10	340,918	375,794	0.49	1,085

Fuel	Emission Factors, kg/MMBtu			Emission Factor
	CO2 (1)	CH4 (2)	N2O (2)	SF6 (4)
Natural Gas	*53.060*	*1.00E-03*	1.00E-04	n/a
Diesel Fuel	*73.960*	3.00E-03	6.00E-04	n/a
Global Warming Potential (3)	1	25	298	22,800

Notes:
1. 40 CFR 98, Table C-1 (revised 11/29/13).
2. 40 CFR 98, Table C-2 (revised 11/29/13).
3. 40 CFR 98, Table A-1 (revised 11/29/13).
4. Sulfur hexafluoride (SF6) will be used as an insulating medium in two circuit breakers. The SF6 contained in one of the circuit breakers is approximately 24 lbs and the remaining breaker will contain approximately 161 lbs. The IEC standard for SF6 leakage is less than 0.5%; the NEMA leakage standard for new circuit breakers is 0.1%. A maximum leakage rate of 0.5% per year is assumed.

Table C-2.17
Puente Power Project
Nitrogen Emission Rates - New Equipment

New Gas Turbine			
NOx emission rate =	36.01	tpy	
N/NO2 molecular weight ratio (14/46) =		0.3043478	
N emission rate from NOx =	10.96	tpy	
	0.32	g/s	
NH3 emission rate =	21.06	tpy	
N/NH3 molecular weight ratio (14/17) =		0.8235294	
N emission rate from NH3 =	17.34	tpy	
	0.50	g/s	
Total N emission rate (N from NOx plus N from ammonia) =	28.30	tpy	
Total N emission rate (N from NOx plus N from ammonia) =	0.81	g/s	
Emergency Engine			
NOx emission rate =	0.09	tpy both units	
N/NO2 molecular weight ratio (14/46) =		0.3043478	
N emission rate from NOx =	0.03	tpy both units	
	0.00	g/s both units	
Total N emission rate for new GT, new/existing engines, existing Unit 3 (N from NOx plus N from ammonia) =	28.33	tpy	

Table C-2.18
Puente Power Project
Nitrogen Emission Rates - Existing Units 1 and 2

NOx emission rate for Units 1 and 2, 5-year avg. (tpy)=	3.21	tpy
NOx emission rate for Units 1 and 2, 10-year avg. (tpy)=	5.88	tpy
N/NO2 molecular weight ratio (14/46) =		0.304348
N emission rate from NOx, 5-year avg. (tpy) =	0.98	tpy
N emission rate from NOx, 10-year avg. (tpy) =	1.79	tpy
NH3 emission rate for Units 1 and 2, 5-year avg. (tpy) =	3.91	tpy
NH3 emission rate for Units 1 and 2, 10-year avg. (tpy) =	6.89	tpy
N/NH3 molecular weight ratio (14/17) =		0.823529
N emission rate from NH3, 5-year avg. (tpy) =	3.22	tpy
N emission rate from NH3, 10-year avg. (tpy) =	5.67	tpy
Total N emission rate for Units 1 and 2 (N from NOx plus N from ammonia), 5-yr avg. =	4.20	tpy
Total N emission rate for Units 1 and 2 (N from NOx plus N from ammonia), 10-yr avg. =	7.46	tpy

APPENDIX C-3

BACT ANALYSIS

Best Available Control Technology Analysis

The new combustion turbine generator (CTG) and emergency engine proposed for the Puente Power Project (P3) are required to use best available control technology (BACT) in accordance with the requirements of Ventura County Air Pollution Control District (VCAPCD or District) rules. BACT is defined in VCAPCD Rule 26.1(3):

> *"**Best Available Control Technology (BACT)**": The most stringent emission limitation or control technology for an emissions unit which:*
>
> *a. Has been achieved in practice for such emissions unit category, or*
>
> *b. Is contained in any implementation plan approved by the Environmental Protection Agency for such emissions unit category. A specific limitation or control shall not apply if the owner or operator of such emissions unit demonstrates to the satisfaction of the Air Pollution Control Officer (APCO) that such limitation or control technology is not presently achievable, or*
>
> *c. Is contained in any applicable New Source Performance Standard or National Emission Standard for Hazardous Air Pollutants set forth in 40 CFR Parts 60 and 61, or*
>
> *d. Any other emission limitation or control technology, including, but not limited to, replacement of such emissions unit with a lower emitting emissions unit, application of control equipment or process modifications, determined by the APCO to be technologically feasible for such emissions unit and cost effective as compared to the BACT cost effectiveness threshold adopted by the Ventura County Air Pollution Control Board.*
>
> *In defining emissions unit categories, the APCO may take into account the function of the emissions unit, the capacity of the emissions unit, the annual throughput of the emissions unit and the location of the emissions unit with respect to electricity or fuels needed to achieve an emission limitation or control technology.*

As discussed in Section 4.1.3.7 of the AFC, the P3 project will not trigger PSD review (including BACT requirements). However, the CTG and emergency generator will trigger District NSR BACT requirements for NOx, reactive organic compounds (ROC), SOx, and PM_{10}. The emission rates and control technologies determined to be BACT for this project are discussed in detail in the following sections. For the CTG, separate determinations are provided for normal operation and startup/shutdown operation. BACT is assessed using EPA's Top-Down methodology.

Steps in a Top-Down BACT Analysis

Step 1 – Identify All Possible Control Technologies

The first step in a top-down analysis is to identify, for the emissions unit and pollutant in question, all available control options. Available control options are those air pollution control technologies or techniques, including alternate basic equipment or processes, with a practical potential for application to the emissions unit in question. The control alternatives should include not only existing controls for the source category in question, but also, through technology transfer, controls applied to similar source categories and gas streams.

BACT must be at least as stringent as what has been achieved in practice (AIP) for a category or class of source. Additionally, EPA guidelines require that a technology that is determined to be AIP for one category of source be considered for transfer to other source categories. There are two types of potentially transferable control technologies: (1) exhaust stream controls, and (2) process controls and modifications. For the first type, technology transfer must be considered between source categories that produce similar exhaust streams. For the second type, technology transfer must be considered between source categories with similar processes.

Candidate control options that do not meet basic project requirements (i.e., alternative basic designs that “redefine the source”) are eliminated at this step.

Step 2 – Eliminate Technologically Infeasible Options

To be considered, the candidate control option must be technologically feasible for the application being reviewed.

Step 3 – Rank Remaining Control Options by Control Effectiveness

All feasible options are ranked in the order of decreasing control effectiveness for the pollutant under consideration. In some cases, a given control technology may be listed more than once, representing different levels of control (e.g., the use of SCR for control of NOx may be evaluated at 2 and 2.5 parts per million by volume, dry [ppmvd], @ 15% O_2). Any control option less stringent than what has been already achieved in practice for the category of source under review must also be eliminated at this step.

Step 4 – Evaluate Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

To be required as BACT, the candidate control option must be cost effective, considering energy, environmental, economic, and other costs. The most stringent control technology for control of one pollutant may have other undesirable environmental or economic impacts. The purpose of Step 4 is to validate the suitability of the top control option or provide a clear justification as to why that option should not be selected as BACT.

Once all of the candidate control technologies have been ranked, and other impacts have been evaluated, the most stringent candidate control technology is deemed to be BACT, unless the other impacts are unacceptable.

Step 5 – Determine BACT/Present Conclusions

BACT is determined to be the most effective control technology subject to evaluation, and not rejected as infeasible or having unacceptable energy, environmental, or cost impacts.

BACT for the Gas Turbine: Normal Operations

NOx EMISSIONS

Step 1 – Identify All Possible Control Technologies

The emission unit for which BACT is being considered is a nominal 275 MW (gross) simple-cycle CTG (GE 7HA.01). Potential NOx control technologies were identified by searching the following sources for determinations pertaining to combustion gas turbines:

- VCAPCD BACT Guidance;
- South Coast Air Quality Management District (SCAQMD) BACT Guidelines;
- San Joaquin Valley Air Pollution Control District (SJVAPCD) BACT Clearinghouse;
- Bay Area Air Quality Management District (BAAQMD) BACT Guidelines;
- EPA Reasonably Available Control Technology (RACT)/BACT/ Lowest Achievable Emission Rate (LAER) Clearinghouse;
- Other district[1] and state BACT Guidelines; and
- BACT/LAER requirements in New Source Review permits issued by a local air district[1] or other air pollution control agency.

Listed below are the technologies for control of NOx that were identified as a result of this search.

- Low NOx burner design (e.g., dry low NOx [DLN] combustors)
- Water or steam injection
- Inlet air coolers
- A Selective Catalytic Reduction (SCR) system capable of continuously complying with a limit of 2.0 ppmvd @15% oxygen (O_2) (1-hour average)
- An EMx (formerly SCONOx) system capable of continuously complying with a limit of 2.0 ppmvd @15% O_2 (1-hour average)
- Selective Non-Catalytic Reduction (SNCR) capable of continuously complying with a limit of 4.5 ppmvd @15% O_2 (1-hour average)
- Alternative Basic Equipment:
  - Renewable Energy Source (e.g., solar, wind, etc.)
  - Combined-Cycle Turbine

It should be noted that the use of renewable energy in lieu of a simple-cycle gas turbine would "redefine the source." Renewable energy facilities require significantly more land to construct

[1] Any air quality management district or air pollution control district in California.

and need to be located in areas with very specific characteristics. Wind and solar facilities have power generation profiles that cannot match demand; conventional power plants are needed in order to follow demand. The capital costs for wind or solar facilities are substantially higher than for a comparable conventional facility, making financing of such a project significantly different. Finally, one of the fundamental objectives of the proposed P3 project is to provide firming capacity for renewable energy facilities, making the use of renewable energy for the project fundamentally incompatible with the project objective. Nevertheless, these technologies are theoretically feasible, and the technical feasibility of renewable energy sources for this specific application will be considered in Step 2.

Step 2 – Eliminate Technologically Infeasible Options

Exhaust Stream Controls

The most recent NOx BACT listings for simple-cycle combustion turbines in this size range are summarized in Table C-3.1. The most stringent NOx limit in these recent BACT determinations is a 2.5 ppm[2] limit averaged over a 1-hour averaging period, excluding startups and shutdowns. This level is achieved using water injection and SCR. The GE 7HA.01 gas turbine proposed for this project will use dry low-NOx (DLE) emissions technology, which yields turbine-out NOx concentrations as low as 25 ppmvd @ 15% O_2, which is comparable to the turbine-out NOx levels for current-generation water-injected gas turbines.

The SCR system uses ammonia injection to reduce NOx emissions. SCR systems have been widely used in simple-cycle gas turbine applications of all sizes. The SCR process involves the injection of ammonia into the flue gas stream via an ammonia injection grid upstream of a reducing catalyst. The ammonia reacts with the NOx in the exhaust stream to form N_2 and water vapor. The catalyst does not require regeneration, but must be replaced periodically; typical SCR catalyst lifetimes are in excess of three years.

Either SCR or EMx technology is capable of achieving a NOx emission level of 2.5 ppmvd @ 15% O_2. Neither has been demonstrated to consistently achieve lower emission levels in simple-cycle turbines in demand-response service. Both technologies are evaluated further in Step 3.

[2] All turbine/HRSG (heat recovery steam generator) exhaust emissions concentrations shown are by volume, dry corrected to 15% O_2.

Table C-3.1
Recent NOx BACT Determinations for Simple-Cycle Combustion Turbines

Facility	District	NOx Limit[a]	Averaging Period	Control Method Used	Date Permit Issued	Source
EI Colton (LM6000)	SCAQMD	3.5 ppmvd	3 hrs	Water injection and SCR	1/10/2003	SCAQMD website
MID Ripon (LM6000)	SJVAPCD	2.5 ppmvd	3 hrs	Water injection and SCR	2004	ATC
SF Electric Reliability Project (LM6000)	BAAQMD	2.5 ppmvd	1 hr	Water injection and SCR	2/8/2006 (FDOC)	CEC website
EIF Panoche (LMS100)	SJVAPCD	2.5 ppmvd	1 hr	Water injection and SCR	7/13/2007 (FDOC)	CEC website
Walnut Creek Energy (LMS100)	SCAQMD	2.5 ppmvd	1 hr	Water injection and SCR	2/27/2008	FDOC
Miramar Energy Facility II (LM6000)	San Diego APCD (SDAPCD)	2.5 ppmvd	3 hrs	Water injection and SCR	11/4/2008	ATC
Orange Grove Energy, LLP (LM6000)	SDAPCD	2.5 ppmvd	1 hr	Water injection and SCR	12/4/2008	CEC website
El Cajon Energy, LLC (LM6000)	SDAPCD	2.5 ppmvd	1 hr	Water injection and SCR	12/11/2009	ATC
TID Almond 2 Power Plant (LM6000)	SJVAPCD	2.5 ppmvd	1 hr	Water injection and SCR	2/16/2010	FDOC
CPV Sentinel (LMS100)	SCAQMD	2.5 ppmvd	1 hr	Water injection and SCR	12/1/2010	FDOC
Mariposa Energy Project (LM6000)	BAAQMD	2.5 ppmvd	1 hr	Water injection and SCR	Nov. 2010	FDOC
Pio Pico Energy Center (LMS100)	SDAPCD	2.5 ppmvd	1 hr	Water injection and SCR	9/12/2012	FDOC
El Segundo Power Facility Modification (Rolls Royce Trent 60)	SCAQMD	2.5 ppmvd	1 hr	Water injection and SCR	8/26/2014	FDOC

Note:
a. All concentrations expressed as parts per million by volume dry, corrected to 15% O_2.

Alternative Basic Technology

Combined-Cycle Gas Turbines

The use of combined-cycle turbines instead of the proposed simple-cycle turbine would be technically infeasible for the project. The simple-cycle turbine is needed to effectively handle variable loads and perform multiple startups/shutdowns per day. While advanced combined-cycle turbines can start relatively quickly (within approximately 12 minutes to reach 100% rated capacity of the gas turbine generator), they may need as much as 2 hours to reach full combined-cycle output (combined output of gas turbine and steam turbine generators).[3] While operating in simple-cycle mode (while waiting for the steam system to warm up), fast-start combined-cycle units will have efficiencies that are no better than, and potentially worse than, those achieved with advanced simple-cycle turbines such as the GE 7HA.01. In addition, advanced combined-cycle gas turbines require an auxiliary steam source to achieve fast startup times. This steam must be provided by an auxiliary boiler, which would be an additional source of emissions and is not a part of this project. Finally, such units cannot perform up to four starts per day—as required for this project—without substantially shortening the life of the unit. Therefore, combined-cycle turbines are eliminated because they do not meet the basic project requirements.

Solar Thermal

Solar thermal facilities collect solar radiation, then heat a working fluid (water or a hydrocarbon liquid) to create steam to power a steam turbine generator. All solar thermal facilities require considerable land for the collection field and are best located in areas of high solar incident energy per unit area. In addition, power is generated only while the sun shines, so the units do not supply power at night or on cloudy days. The P3 parcel is not sufficiently large to be feasible for a commercial solar power plant. Furthermore, a solar power plant would not meet the project's objective of providing firming capability for intermittent renewable resources such as solar and wind energy projects. For these reasons, a solar thermal power plant is rejected as BACT for this application.

Wind

Wind power facilities use a wind-driven rotor to turn a generator to generate electricity. Only limited sites in California have an adequate wind resource to allow for the economic construction and operation of large-scale wind generators. Most of these sites have already been developed or are remote from electric load centers and have little or no transmission access. Even in prime locations the wind does not blow continuously, so power is not always available. Due to limited available space on the P3 parcel, limited dependability, and relatively high cost, this technology is not feasible for this project. Furthermore, a wind power plant would not meet the project's objective of providing firming capability for intermittent renewable resources such as solar and wind energy projects. For these reasons, a wind power plant is rejected as BACT for this application.

[3] El Segundo Energy Center LLC, 00-AFC-014C: Petition to Amend, 4/23/13, Section 2.2.7

Other Alternatives

A number of other alternative generating systems are described in the Alternatives Analysis Section 5.0 of this AFC. These additional analyses fail to identify an alternative generating technology that is technically feasible for this site and that would meet the project's objectives.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Both SCR and EMx technologies, each in combination with combustion controls, are capable of achieving a NOx emission level of 2.5 ppmvd @ 15% O_2. They are therefore ranked together in terms of control effectiveness, and the evaluation of these technologies continues in Step 4.

Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

The use of SCR will result in ammonia emissions due to an allowable ammonia slip limit of 5 ppmvd @ 15% O_2. A health risk screening analysis of the proposed project using air dispersion modeling has been prepared to demonstrate that both the acute health hazard index and the chronic health hazard index are much less than 1, based on an ammonia slip limit of 5 ppmvd @ 15% O_2. In accordance with currently accepted practice, a hazard index below 1.0 is not considered significant. Therefore, the toxic impact of the ammonia slip resulting from the use of SCR is deemed to be not significant, and is not a sufficient reason to eliminate SCR as a control alternative.

A second potential environmental impact that may result from the use of SCR involves the storage and transport of aqueous or anhydrous ammonia.[4] Although ammonia is toxic if swallowed or inhaled and can irritate or burn the skin, eyes, nose, or throat, it is a commonly used material that is typically handled safely and without incident. The project operator will be required to develop and maintain a Risk Management Plan (RMP) and to implement a Risk Management Program to prevent accidental releases of ammonia. The RMP provides information on the hazards of the substance handled at the facility and the programs in place to prevent and respond to accidental releases. The accident prevention and emergency response requirements reflect existing safety regulations and proven industry safety codes and standards. Thus, the potential environmental impact due to aqueous ammonia use at the Project is minimal and does not justify the elimination of SCR as a control alternative.

Regeneration of the EMx catalyst is accomplished by passing hydrogen gas over an isolated catalyst module. The hydrogen gas is generated by reforming steam, so steam would be required. This would require installation of an auxiliary boiler, which is not currently proposed for this project. There would also be additional natural gas consumption, and increased emissions, per megawatt hour of electricity produced associated with operation of the steam reformer.

"Achieved in Practice" Criteria

In general, the method for determining when emission control technologies are achieved in practice (AIP) is similar in each District. The SCAQMD has established formal criteria for

[4] The Project proposes to use the less concentrated, safer aqueous form of ammonia.

determining when emission control technologies should be considered AIP for the purposes of BACT determinations. The criteria include the elements outlined below.

- *Commercial Availability* **–** At least one vendor must offer this equipment for regular or full-scale operation in the United States. A performance warranty or guarantee must be available with the purchase of the control technology, as well as parts and service.
- *Reliability* **–** All control technologies must have been installed and operated reliably for at least six months. If the operator did not require the basic equipment to operate daily, then the equipment must have at least 183 cumulative days of operation. During this period, the basic equipment must have operated (1) at a minimum of 50% design capacity, or (2) in a manner that is typical of the equipment in order to provide an expectation of continued reliability of the control technology.
- *Effectiveness* **–** The control technology must be verified to perform effectively over the range of operation expected for that type of equipment. If the control technology will be allowed to operate at lesser effectiveness during certain modes of operation, then those modes of operation must be identified. The verification shall be based on a performance test or tests, when possible, or other performance data.

Each of these criteria is discussed separately below for SCR and for EMx.

<u>SCR Technology</u> – SCR has been achieved in practice at numerous combustion turbine installations throughout the world. There are numerous simple-cycle gas turbine projects that limit NOx emissions to 2.5 ppmc using SCR technology, as shown in Table C-3.1. An evaluation of the proposed AIP criteria as applied to the achievement of 2.5 ppmc, and to extremely low NOx levels (below 2.5 ppmc) using SCR technology, is summarized below.

- Commercial Availability: Turbine-out NOx from the GE 7HA.01 gas turbine is generally guaranteed at 25 ppmc. Achieving a controlled NOx limit below 2.5 ppmc would require SCR technology to achieve reductions greater than 90 percent. Furthermore, because of the relatively high temperature of exhaust from simple-cycle turbines compared with combined-cycle units, there is a more limited selection of SCR technology available. Consequently, it is not clear that this criterion is satisfied for limits below 2.5 ppmc for the GE 7HA.01 gas turbine. As shown in Table C-3.1, this criterion is satisfied for gas turbines at a 2.5 ppmc permit level.
- Reliability: SCR technology has been shown to be capable of achieving NOx levels consistent with a 2.5 ppmc permit limit during extended, routine operations at many commercial power plants. There are no reported adverse effects of operation of the SCR system at these levels on overall plant operation or reliability. There has been no demonstration of operation at levels below 2.5 ppmc during extended, routine operation of simple-cycle gas turbines; consequently, this criterion is not satisfied for NOx limits below 2.5 ppmc.
- Effectiveness: SCR technology has been demonstrated to achieve NOx levels of 2.5 ppmc with turbines, but not at lower limits for this generating technology. Short-term excursions have resulted in NOx concentrations above the permitted level of 2.5 ppmc; however, these excursions are not frequent and have not been associated with diminished effectiveness of the SCR system. Rather, these excursions typically have been associated

with SCR inlet NOx levels in excess of those for which the SCR system was designed, or with malfunctions of the ammonia injection system. Consequently, this criterion is satisfied at a NOx limit of 2.5 ppmc, but not at lower NOx limits.

- Conclusion: SCR technology capable of achieving NOx levels of 2.5 ppmc is considered to be achieved in practice. The permit limits for the proposed project CTG include a NOx limit of 2.5 ppmc. This proposed limit is consistent with the available data. The AIP criteria are not met for SCR on simple-cycle gas turbines at NOx limits lower than 2.5 ppmc.

<u>EMx Technology</u> – EMx has been demonstrated in service in five applications: the Sunlaw Federal cogeneration plant, the Wyeth BioPharma cogeneration facility, the Montefiore Medical Center cogeneration facility, the University of California San Diego facility, and the City of Redding Power Plant. The combustion turbines at these facilities are much smaller than for the proposed project turbine, and none of the existing installations are simple-cycle turbines. The largest installation of the EMx system is at the Redding Power Plant. The Redding Power Plant includes two combined-cycle combustion turbines—a 43 MW Alstom GTX100 with a permitted NOx emission rate of 2.5 ppmc (Unit 5), and a 45 MW Siemens SGT 800 with a permitted NOx emission rate of 2.0 ppmc (Unit 6).

A review of NOx continuous emissions monitoring (CEM) data obtained from the EPA's Acid Rain program website[5] indicates a <u>mean</u> NOx level for the Redding Unit 5 of less than 1.0 ppm during the period from 2002 to 2007, but not continuous compliance with a 2.5 ppmc limit. After the first year of operation, Unit 5 experienced only a few hours of non-compliance per year (fewer than 0.1% of the annual operating hours exceed that plant's NOx permit limit of 2.5 ppmc). The experience at the Redding Power Plant indicates the ability of the EMx system to control NOx emissions to levels of 2.5 ppmc. These data do not indicate the ability to consistently achieve NOx levels below 2.0 ppm, notwithstanding the lower annual average emission rate. This is due to the cyclical nature of EMx NOx levels between plant shutdowns and scheduled catalyst cleanings.

Redding Unit 6 started up on October 2011. A review of annual Title V compliance certification reports for the unit indicates that the number of NOx emissions-related deviations has declined between 2012 and 2014. The deviations during the early years were generally related to the inability of the EMx system to achieve control of NOx emissions within the 2-hour startup period allowed by the permit, and not to any failure to maintain the 2.0 ppmc limit during routine operation. However, based on the fundamental design criterion of multiple daily startups of the P3 gas turbine, the startup issues experienced at Redding Unit 6 suggest that the EMx NOx control technology could not be successfully applied to the proposed Project.

Based on this information, the following paragraphs evaluate the proposed AIP criteria as applied to the achievement of low NOx levels (2.5 ppmc) using EMx technology.

- Commercial Availability: While a proposal has not been sought, presumably EmeraChem would offer standard commercial guarantees for the proposed project.

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[5] Available at *http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=prepackaged.results*.

Consequently, this criterion is expected to be satisfied. However, no EMx units are currently in operation on simple-cycle units.

- Reliability: Redding Unit 5 was originally permitted with a 2.0 ppmc permit limit. It was subsequently found that the unit could not maintain compliance with a 2.0 ppmc limit on a consistent basis, and the limit was eventually changed to 2.5 ppmc. As discussed above, based on a review of the CEM data for Redding Unit 5, the EMx system complied with the 2.5 ppmc NOx permit limit but with a few hours each year of excess emissions (approximately 3% of annual operating hours following the first year, and approximately 2% following the second year, dropping to approximately 0.1% after 4 years). This level of performance was also associated with some significant operating and reliability issues. According to a June 23, 2005 letter from the Shasta County Air Quality Management District,[6] repairs to the EMx system began shortly after initial startup and have continued during several years of operation. Redesign of the EMx system was required due to a problem with the reformer reactor combustion production unit that led to sulfur poisoning of the catalyst, despite the sole use of low-sulfur, pipeline quality natural gas as the turbine fuel. In addition, the EMx system catalyst washings had to occur at a frequency several times higher than anticipated during the first three years of operation, which resulted in substantial downtime of the combustion turbine. Since the Redding Power Plant installation is the most representative of all of the EMx-equipped combustion turbine facilities for comparison to the proposed Project, the problems encountered at the Redding plant bring into question the reliability of the EMx system for the proposed project. In addition, the EMx unit has not been demonstrated in use in a simple-cycle application.

- Effectiveness: The EMx system at Redding Power Plant Unit 5 has recently been able to demonstrate compliance with a NOx level of 2.0 ppmc, and the new Redding Unit 6 has been permitted with a 2.0 ppmc NOx limit. As discussed above, the number of known excursions beyond the permit limit for Unit 6 has declined since the unit started up in 2011; however, there are no EMx-equipped facilities on simple-cycle facilities in demand-response service. In addition, Redding Unit 6 is a combined-cycle unit. Consequently, due to the lack of actual performance data in a comparable installation, there is some question regarding the effectiveness of the EMx systems on simple-cycle, demand-response combustion turbine projects.

  There are additional issues with the application of EMx technology to simple-cycle gas turbines. First, simple-cycle turbines have significantly higher turbine exhaust gas temperatures (approximately 900°F) than the typical combined-cycle temperature (around 500°F) at the location of the emission control systems. The higher temperature would require the use of tempering air fans to cool the exhaust gas before it reaches the EMx catalyst. Additionally, simple-cycle units do not produce steam, which is needed as a carrier gas for the regeneration hydrogen. As a result, the project would have to add a small auxiliary steam boiler, which is not currently part of the facility. The auxiliary

[6] Letter dated June 23, 2005, from Shasta County Air Quality Management District to the Redding Power Plant regarding Unit 5 demonstration of compliance with its NOx permit limit.

boiler would also use natural gas fuel and produce emissions, resulting in reduced overall plant efficiency as well as higher criteria and GHG emissions.

- Conclusion: EMx systems are capable of achieving NOx levels of 2.5 ppmc and potentially lower levels. However, the operating history does not support a conclusion that this technology is achieved in practice for simple-cycle, demand-response turbines, based on the above guidelines.

Summary of Achieved in Practice Evaluation

SCR's capability to consistently achieve 2.5 ppmc NOx (1-hour average) in simple-cycle turbines has been demonstrated by numerous installations. EMx's ability to consistently achieve a NOx emission rate below 2.5 ppmc in large turbines has not been demonstrated, nor has the technology been demonstrated in simple-cycle, demand-response service. An emission level of 2.5 ppmc NOx has therefore been achieved in practice, and any BACT determination must be at least as stringent as that.

Technologically Feasible/Cost Effective Criterion

No candidate technology with lower emission levels than those achieved in practice has been identified.

Step 5 – Determine BACT/Present Conclusions

BACT must be at least as stringent as the most stringent level achieved in practice, federal NSPS, or district prohibitory rule. Based upon the results of this analysis, the NOx BACT determinations of 2.5 ppmc on a 1-hour average basis made for recently permitted simple-cycle turbine projects in SCAQMD and SDAPCD reflect the most stringent NOx emission limit that has been achieved in practice. No more stringent level has been suggested as being technologically feasible. Therefore, BACT/LAER for NOx for this application is any technology capable of achieving 2.5 ppmc on a 1-hour average basis.

Both SCR and EMx are expected to achieve the proposed BACT NOx emission limit of 2.5 ppmc averaged over one hour. However, concerns remain regarding the long-term effectiveness of EMx as a control technology because the technology has not been demonstrated on the type of turbine used in this project—a simple-cycle demand-response application. For the reasons described in the "achieved in practice" discussion above, EMx technology is eliminated as BACT, and SCR has been selected as the NOx control technology to be used for the Project.

The gas turbine used for the proposed project will be designed to meet a NOx level of 2.5 ppmc on a 1-hour average basis using SCR.

ROC EMISSIONS

Step 1 – Identify All Possible Control Technologies

Most ROCs emitted from natural gas-fired turbines are the result of incomplete combustion of fuel. Therefore, most of the ROCs are methane and ethane, which are not effectively controlled by an oxidation catalyst. However, oxidation catalyst technology designed to control CO can also provide some degree of control of ROC emissions, especially the more complex and toxic compounds formed in the combustion process. Therefore, the use of good combustion practices is generally considered BACT for ROC, with some additional benefit provided by an oxidation catalyst.

Alternative basic equipment—including renewable energy sources, such as solar and wind, and combined-cycle technology—was already discussed above (Step 1 for NOx BACT on the CTGs). For the same reasons discussed above for NOx, solar, wind and other renewable energy sources are rejected as ROC BACT for this application.

Step 2 – Eliminate Technologically Infeasible Options

The only technology under consideration is combustion controls, with some additional benefit provided by an oxidation catalyst. This combination of technologies has been demonstrated to be feasible in many applications. No other technologies have been identified that are capable of achieving the same level of control. As a result, the goal of the rest of this analysis is to determine the appropriate emission limit that constitutes BACT for this application.

As shown in Table C-3.2, CARB's BACT guidance document for electric generating units rated at greater than 50 MW indicates that BACT for the control of ROC emissions for simple-cycle power plants is 2 ppmvd @ 15% O_2.

The BAAQMD's BACT guidelines do not include a BACT determination for ROC for simple-cycle turbines greater than 40 MW.

The SJVAPCD's most recent BACT determination for ROC for gas turbines rated at larger than 47 MW with variable load and without heat recovery was for the Turlock Irrigation District (TID) Almond 2 Power Plant project. The SJVAPCD concluded that a ROC exhaust concentration of 2.0 ppmvd @ 15% O_2, 3-hour average basis, constituted BACT that is considered technologically feasible.

The SCAQMD's most recent BACT determination for ROC emissions from simple-cycle gas turbines was for the El Segundo Power Facility Modification. The SCAQMD determined that a ROC exhaust concentration of 2.0 ppmc, 1-hour average basis, was BACT for two 60 MW Rolls Royce Trent gas turbines.

In May 2012, the SDAPCD determined that 2.0 ppmc, 1-hour average basis, was BACT for ROC for the LMS100 gas turbines to be used at the Pio Pico Energy Center project.

Table C-3.2
CARB BACT Guidance for Power Plants

Pollutant	BACT
Nitrogen Oxides	2.5 ppmv @ 15% O_2 (1-hour average) 2.0 ppmv @ 15% O_2 (3-hour average)
Sulfur Dioxide	Fuel sulfur limit of 1.0 grains/100 scf
Carbon Monoxide	Nonattainment areas: 6 ppmv @ 15% O_2 (3-hour average) Attainment areas: District discretion
ROC	2 ppmv @ 15% O_2 (3-hour average)
NH_3	5 ppmv @ 15% O_2 (3-hour average)
PM_{10}	Fuel sulfur limit of 1.0 grains/100 scf

Published prohibitory rules from the BAAQMD, Sacramento Metropolitan AQMD (SMAQMD), SDAPCD, SJVAPCD, and SCAQMD were reviewed to identify the ROC standards that govern existing natural gas-fired simple-cycle combustion gas turbines. None of the prohibitory rules for combustion gas turbines specify an emission limit for ROC. The applicable NSPS (40 CFR 60 Subpart KKKK) does not include a ROC limit.

This "top-down" ROC BACT analysis will consider the following ROC emission limitations:

- 2 ppmvd @ 15% O_2

A summary of recent ROC BACT determinations is shown in Table C-3.3.

Table C-3.3

Recent ROC BACT Determinations for Simple-Cycle Combustion Turbines

Facility	District	ROC Limit[a]	Averaging Period	Control Method Used	Date Permit Issued	Source
EIF Panoche (LMS100)	SJVAPCD	2.0 ppmc	3 hrs	Oxidation Catalyst	7/13/2007 (FDOC)	CEC website
Starwood Midway Firebaugh/ Panoche (P&W SwiftPac)	SJVAPCD	2.0 ppmc	3 hrs	Oxidation Catalyst	9/5/2007 (FDOC)	CEC website
Walnut Creek Energy (LMS100)	SCAQMD	2.0 ppmc	1 hr	Oxidation Catalyst	2/27/2008	FDOC
Orange Grove Energy, LLP (LM6000)	SDAPCD	2.0 ppmc	1 hr	Oxidation Catalyst	12/4/2008	CEC website
El Cajon Energy, LLC (LM6000)	SDAPCD	2.0 ppmc	1 hr	Oxidation Catalyst	12/11/2009	ATC
TID Almond 2 Power Plant (LM6000)	SJVAPCD	2.0 ppmc	3 hrs	Oxidation Catalyst	2/16/2010	FDOC
CPV Sentinel (LMS100)	SCAQMD	2.0 ppmc	1 hr	Oxidation Catalyst	12/1/2010	FDOC
Pio Pico Energy Center (LMS100)	SDAPCD	2.0 ppmc	1 hr	Oxidation Catalyst	9/12/2012	FDOC
El Segundo Power Facility Modification	SCAQMD	2.0 ppmc	1 hr	Oxidation Catalyst	8/26/2014	FDOC

Note:
a. All concentrations expressed as parts per million by volume dry, corrected to 15% O_2 (ppmc).

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The control technologies under consideration are ranked as follows:

- 2 ppmvd @ 15% O_2

Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

This step evaluates any source-specific environmental, energy, or economic impacts that demonstrate that the top alternative listed in the previous step is inappropriate as BACT.

The Applicant has proposed to meet a 2.0 ppmvd limit on a 1-hour average basis. This level meets BACT.

Step 5 – Determine BACT/Present Conclusions

BACT must be at least as stringent as the most stringent achieved in practice, required in a federal NSPS or district prohibitory rule, or considered technologically feasible. Based upon the results of this analysis, the ROC emission limit of 2.0 ppmc is considered to be BACT for the proposed project.

SULFUR OXIDE EMISSIONS

Step 1 – Identify All Possible Control Technologies

Natural gas fired combustion turbines have inherently low SOx emissions due to the small amount of sulfur present in the fuel. With typical pipeline quality natural gas sulfur content well below 1 grain/100 scf, the SOx emissions for natural gas fired combustion turbines are orders of magnitude less than oil-fired turbines. Firing by natural gas, and the resulting control of SOx emissions, has been used by numerous combustion turbines throughout the world. Due to the prevalence of the use of natural gas to control SOx emissions from combustion turbines, only an abbreviated discussion of post-combustion controls will be addressed in this section.

Post-combustion SOx control systems include dry and wet scrubber systems. These types of systems are typically installed on high SOx emitting sources such as coal-fired power plants.[7]

Step 2 – Eliminate Technically Infeasible Options

All of the control options discussed above are technically feasible.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The typical SOx control level for a well-designed wet or dry scrubber installed on a coal-fired boiler ranges from approximately 70% to 90%,[8] with some installations achieving even higher control levels.

Step 4 – Evaluate Most Effective Controls and Document Results

The use of low sulfur content pipeline natural gas has been achieved in practice at numerous combustion turbine installations throughout the world, and the use of this fuel minimizes SOx emissions. While it would be theoretically feasible to install some type of post-combustion control such as a dry/wet scrubber system on a natural gas fired turbine, due to the inherently low SOx emissions associated with the use of natural gas, these systems are not cost effective and regulatory agencies do not require them. Consequently, no further discussion of post-combustion SOx control is necessary.

[7] Although EmeraChem previously offered the ESx catalyst system, that product no longer appears to be on the market.

[8] Air Pollution Control Manual, Air and Waste Management Association, Second Edition, page 206.

Step 5 – Determine BACT/Present Conclusions

BACT for this project is the use of pipeline-quality natural gas. The SOx control method for the proposed project is the use of pipeline-quality natural gas. Consequently, the proposed project is consistent with BACT requirements.

$PM_{10}/PM_{2.5}$ EMISSIONS

Step 1 – Identify All Possible Control Technologies

Alternative basic equipment—including renewable energy sources, such as solar and wind—has also been identified as a potential option for the control of $PM_{10}/PM_{2.5}$ emissions. Such alternative basic equipment was already discussed above (Step 1 for NOx BACT on the CTG). For the same reasons discussed above for NOx, solar, wind and other renewable energy sources are rejected as $PM_{10}/PM_{2.5}$ BACT for this application.

Achievable Controlled Levels and Available Control Options

PM emissions from natural gas-fired turbines primarily result from carryover of noncombustible trace constituents in the fuel. PM emissions are minimized by using clean-burning pipeline quality natural gas with low sulfur content.

The CARB BACT Clearinghouse, as well as the BAAQMD BACT guideline, identifies the use of natural gas as the primary fuel as "achieved in practice" for the control of $PM_{10}/PM_{2.5}$ for combustion gas turbines.

CARB's BACT guidance document for stationary gas turbines used for power plant configurations[9] indicates that BACT for the control of PM emissions is an emission limit corresponding to natural gas with a fuel sulfur content of no more than 1 grain/100 standard cubic foot.

Title 40 CFR Part 60 Subpart KKKK contains the applicable NSPS for combustion gas turbines. Subpart KKKK does not regulate $PM_{10}/PM_{2.5}$ emissions.

Published prohibitory rules from the SCAQMD, SJVAPCD, SMAQMD, and SDAPCD were reviewed to identify the PM_{10} standards that govern natural gas-fired combustion gas turbines. These prohibitory rules do not regulate $PM_{10}/PM_{2.5}$ emissions.

In the recently issued PSD permit for the Pio Pico project, EPA performed an extensive BACT analysis for PM_{10}. This analysis included a review of data specifically for the GE LMS100 simple-cycle turbines. EPA considered what PM_{10} limit would be technically feasible to meet on an ongoing basis, in addition to reviewing source test data from GE LMS100 turbines installed at other locations and reviewing permit limits for other installations with the same model and size turbine, operated in simple-cycle mode. The most recent approved BACT $PM_{10}/PM_{2.5}$ limit for an LMS100 gas turbine is 5.0 lb/hr for Pio Pico Energy Center, as approved on February 28, 2014.[10] This is the lowest BACT $PM_{10}/PM_{2.5}$ limit approved for GE LMS100 simple-cycle

[9] Ibid, Table I-2.
[10] EPA PSD Permit for PPEC, http://www.regulations.gov/#!documentDetail;D=EPA-R09-OAR-2011-0978-0034

turbines. This emission limit can be scaled to approximately 13.2 lbs/hr[11] for the larger GE 7HA.01 unit.

The “top-down” $PM_{10}/PM_{2.5}$ BACT analysis will consider the following emission limitations:

GE 7HA.01

- 10.6 lb/hr

Step 2 – Eliminate Technologically Infeasible Options

As discussed above, solar, wind and other renewable energy alternatives are not considered technologically feasible for this application.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

No control technology other than use of clean natural gas fuel has been identified for this application.

Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

No control technology other than use of clean natural gas fuel has been identified for this application.

Step 5 – Determine BACT/Present Conclusions

Based upon the results of this analysis, the use of natural gas as the primary fuel source constitutes BACT for $PM_{10}/PM_{2.5}$ emissions from combustion gas turbines. Through the use of natural gas, the turbine is expected to be able to meet the proposed emission limits of 10.6 lbs/hr for the GE 7HA.01 turbine.

[11] Based on heat input rating of approximately 950 MMBtu/hr for GE LMS100 vs. 2,500 MMBtu/hr for GE 7HA.01 (2,500/950 x 5 lbs/hr = 13.2 lbs/hr).

BACT for the Simple-Cycle CTGs: Startup/Shutdown

Startup and shutdown periods are a normal part of the operation of simple-cycle power plants such as the P3. BACT must also be applied during the startup and shutdown periods of gas turbine operation. The BACT limits discussed in the previous section apply to steady-state operation, when the turbine has reached stable operations and the emission control systems are fully operational.

NOx EMISSIONS

Step 1 – Identify All Possible Control Technologies

The following technologies for control of NOx during startups and shutdowns have been identified:

- A Selective Catalytic Reduction (SCR) system capable of continuously complying with a limit of 2.5 ppmc (1-hour average);
- Fast-start technologies; and
- Operating practices to minimize the duration of startup and shutdown.

The GE 7HA.01 turbine proposed for this project is controlled by SCR, which will operate at all times that the stack temperature is in the proper operating range.

Step 2 – Eliminate Technologically Infeasible Options

During gas turbine startup, there are equipment and process requirements that must be met in sequential order to protect the equipment.

For all turbine technologies, incomplete combustion at low loads results in higher CO and ROC emission rates. Furthermore, the post-combustion controls that are used to achieve additional emissions reductions (SCR and oxidation catalyst) require that specific exhaust temperature ranges be reached to be fully effective. The use of SCR to control NOx is not technically feasible when the surface of the SCR catalyst is below the manufacturer’s recommended operating range. When catalyst surface temperatures are low, ammonia will not react completely with the NOx, resulting in excess NOx emissions or excess ammonia slip or both. The oxidation catalyst is not effective at controlling CO emissions when exhaust temperature is below the optimal temperature range. Therefore, exhaust gas controls used to achieve BACT for normal operations are not feasible control techniques during startups and shutdowns.

This “top-down” BACT analysis will consider the following NOx emission limitations:

- Operating practices to minimize emissions during startup and shutdown; and
- Design features to minimize the duration of startup and shutdown.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Operating Practices to Minimize Emissions during Startup and Shutdown

There are basic principles of operation, or Best Management Practices, that minimize emissions during startups and shutdowns. These Best Management Practices are outlined below.

- During a startup, bring the gas turbine to the minimum load necessary to achieve compliance with the applicable NOx and CO emission limits as quickly as possible, consistent with the equipment manufacturers' recommendations and safe operating practices.
- During a startup, initiate ammonia injection to the SCR system as soon as the SCR catalyst temperature and ammonia vaporization system have reached their minimum operating temperatures.
- During a shutdown, once the turbine reaches a load that is below the minimum load necessary to maintain compliance with the applicable NOx and CO emission limits, reduce the gas turbine load to zero as quickly as possible, consistent with the equipment manufacturers' recommendations and safe operating practices.
- During a shutdown, maintain ammonia injection to the SCR system as long as the SCR catalyst temperature and ammonia vaporization system remain above their minimum operating temperatures.

A key underlying consideration of these Best Management Practices is the overall safety of the plant staff by promoting operation within the limitations of the equipment and systems, and allowing for operator judgment and response times to respond to alarms and trips during the startup sequence.

Design Features to Minimize the Duration of Startup and Shutdown

An additional technique to reduce startup emissions is to minimize the amount of time the gas turbine spends in startup. The use of simple-cycle gas turbine technology inherently minimizes this time, in that simple-cycle gas turbines generally start up and shut down much more quickly than combined-cycle turbines.

Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

Utilizing best operating practices to minimize emissions during startups and shutdowns has no adverse environmental or energy impacts, nor does it require additional capital expenditure.

The approach of reducing startup/shutdown duration has no adverse environmental or energy impacts, and the use of simple-cycle generating technology minimizes startup/shutdown duration.

Step 5 - Determine BACT/Present Conclusions

BACT for NOx during startups/shutdowns is the use of operating systems/practices that reduce the duration of startups and shutdowns to the greatest extent feasible, and the use of operational techniques to initiate ammonia injection as soon as possible during a startup. Therefore, BACT is determined to be the use of simple-cycle gas turbine technology and the application of operating systems/practices that minimize startup and shutdown durations, in combination with the use of operational techniques to initiate ammonia injection as soon as possible during a startup.

ROC EMISSIONS

Step 1 – Identify All Possible Control Technologies

The ROC control technologies under consideration for startups and shutdowns are ranked as follows:

- Operating practices to minimize the duration of startup and shutdown

Step 2 – Eliminate Technologically Infeasible Options

None of the proposed alternatives is infeasible for this application.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The only proposed control technology is operating practices to minimize the duration of startups and shutdowns.

Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

ROC emissions during startup and shutdown are minimized by minimizing the duration of startup and shutdown.

Step 5 – Determine BACT/Present Conclusions

BACT for ROC during startups/shutdowns is the use of simple-cycle gas turbine technology and operating practices that reduce the duration of startups and shutdowns to the greatest extent feasible.

SULFUR OXIDE EMISSIONS

Step 1 – Identify All Possible Control Technologies

The SOx control technologies under consideration for startups and shutdowns are ranked as follows:

- Use of natural gas as a fuel
- Operating practices to minimize the duration of startup and shutdown

Step 2 – Eliminate Technologically Infeasible Options

None of the proposed alternatives is infeasible for this application.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Ranking for the control technologies is as indicated in Step 1.

Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

SOx emissions during startup and shutdown are minimized by minimizing duration of startup and shutdown.

Step 5 – Determine BACT/Present Conclusions

BACT for SOx during startups/shutdowns is the use of simple-cycle gas turbine technology and operating practices that reduce the duration of startups and shutdowns to the greatest extent feasible.

$PM/PM_{10}/PM_{2.5}$ EMISSIONS

Step 1 – Identify All Possible Control Technologies

The analysis for particulate emissions is identical to the analysis for SOx.

Step 2 – Eliminate Technologically Infeasible Options

The analysis for particulate emissions is identical to the analysis for SOx.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The analysis for particulate emissions is identical to the analysis for SOx.

Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

The analysis for particulate emissions is identical to the analysis for SOx.

Step 5 – Determine BACT/Present Conclusions

BACT for particulate during startups/shutdowns is the use of simple-cycle gas turbine technology and operating practices that reduce the duration of startups and shutdowns to the greatest extent feasible.

SUMMARY

Proposed BACT determinations for the P3 gas turbine are summarized in Table C-3.4.

Table C-3.4
Proposed BACT Determinations for P3 Gas Turbine

Pollutant	Proposed BACT Determination for the GE 7HA.01
Nitrogen Oxides	Dry low-NOx combustion controls and SCR systems, 2.5 ppmc[a], 1-hour average, with exemptions for startup/shutdown conditions
Sulfur Dioxide	Natural gas fuel (sulfur content not to exceed 0.75 grain/100 scf)
ROC	Good combustion practices, 2.0 ppmc, 1-hour average
PM_{10}	Natural gas fuel, 10.6 PM_{10} lbs/hr
Startup/Shutdown	Best operating practices to minimize startup/shutdown times and emissions
Note: a. ppmc: parts per million by volume, corrected to 15% O_2.	

BACT for the Emergency Engine: Normal Operations

The emission unit for which BACT is being considered is a nominal 779 HP Tier 4 (final) Caterpillar Diesel engine driving a 500 kW emergency generator. Potential control levels were identified by searching the following sources for BACT determinations pertaining to emergency Diesel engines:

- VCAPCD BACT Guidance;
- South Coast Air Quality Management District (SCAQMD) BACT Guidelines;
- San Joaquin Valley Air Pollution Control District (SJVAPCD) BACT Clearinghouse;
- Bay Area Air Quality Management District (BAAQMD) BACT Guidelines;
- EPA Reasonably Available Control Technology (RACT)/BACT/ Lowest Achievable Emission Rate (LAER) Clearinghouse.

NOx EMISSIONS

Step 1 – Identify All Possible Control Technologies

Listed below are the technologies for control of NOx that were identified as a result of review of sources of BACT determinations.

- Combustion process modifications. Design features that minimize emissions include electronic fuel/air ratio and timing controllers, pre-chamber ignition, and intercoolers. These design features form the basis for EPA's Tier emission standards, and are therefore considered the baseline case for purposes of the BACT analysis.
- Selective Catalytic Reduction (SCR): This is an add-on control technology that reduces NOx emissions by reaction with ammonia in the presence of a catalyst.
- Non-selective Catalytic Reduction (NSCR): Similar to automobile catalytic converters, this is an add-on control technology that reduces NOx emissions by reacting NOx with CO and hydrocarbons to form CO_2, N_2, and H_2O. This catalyst requires a fuel-rich exhaust to work, and is therefore not applicable to Diesel engines, which operate in a lean-burn mode.

Step 2 – Eliminate Technologically Infeasible Options

As discussed in Step 1, NSCR is not technologically feasible for a lean-burn IC engine. It was therefore eliminated from consideration for BACT for this application.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The most recent NOx BACT listings for Diesel emergency engines in this size range are summarized in Table C-3.5. The most stringent NOx limit in these recent BACT determinations is a 0.5 gm/hp-hr limit, based on compliance with applicable EPA Tier 4 standards and the federal NSPS Subpart IIII.

Table C-3.5
Recent NOx BACT Determinations for Emergency Compression-Ignition Engines

Facility	District	NOx Limit[a,b]	Control Method Used	Date Permit Issued	Source
Power Systems	SCAQMD	4.8 (Tier 2 limit)	Engine Designed to meet EPA Tier 2	8/29/2002	SCAQMD BACT (A/N 392543)
General Guidelines	SCAQMD	3.0 (Tier 3 limit)	Engine Designed to meet EPA Tier 3	7/14/2006	SCAQMD guidelines for non-major facilities
BACT Handbook	BAAQMD	3.0 (CARB ATCM)	Engine Designed to meet EPA Tier 3	12/22/2010	BAAQMD BACT guideline 96.1.3
BACT Guidelines	SJVAPCD	3.0 (Tier 3 limit)	Engine Designed to meet EPA Tier 3	9/10/2013	SJVAPCD BACT Guideline 3.1.1
Energy Answers Arecibo	Puerto Rico	2.85	Engine Design	4/10/2014	EPA RBL Clearinghouse
EPA Tier 4 (final)		0.5	Engine Design		40 CFR 1039.101
AQMD Prohibitory Rule	Rule 74.9.B.1	80 ppm	Not Specified	11/78/05	VCAPCD Rule 74.9
Federal NSPS	Subpart IIII	0.5	Engine Designed to meet EPA Tier 4 (final)		40 CFR 60.4205

Note:
a. All concentrations expressed as grams per horsepower-hour
b. For Tier 2 and Tier 3 limits, values are for NOx + NMHC.

Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

The most stringent limit in Table C-3.5 is the EPA Tier 4 (final) limit. Engine manufacturers are using a combination of techniques, including incorporation of exhaust control devices as part of the basic engine, to achieve this limit. For this reason, an engine capable of achieving EPA Tier 4 (final) limits is the most effective control technology considering environmental, energy, and cost impacts.

Step 5 – Determine BACT/Present Conclusions

BACT must be at least as stringent as the most stringent level achieved in practice, federal NSPS, or district prohibitory rule. Based upon the results of this analysis, the NOx emission rate of 0.5 gm/hp-hr required to meet EPA Tier 4 (final) requirements is BACT. No more stringent level has been suggested as being technologically feasible. Therefore, BACT/LAER for NOx for this application is any technology capable of achieving 0.5 gm/hp-hr.

The engine selected for this project is equipped with advanced combustion controls, and is certified to meet Tier 4 (final) standards, and therefore complies with BACT for NOx.

ROC EMISSIONS

Listed below are the technologies for control of ROC that were identified as a result of review of sources of BACT determinations.

- Combustion process modifications. Design features that minimize emissions include electronic fuel/air ratio and timing controllers, pre-chamber ignition, and intercoolers. These design features form the basis for EPA's Tier emission standards, and are therefore considered the baseline case for purposes of the BACT analysis.
- Catalytic Oxidation: This is an add-on control technology that oxidizes ROC emissions by reaction with the oxygen in the exhaust in the presence of a catalyst. Typical vendor guarantees are 50 percent reduction in ROC.

Step 2 – Eliminate Technologically Infeasible Options

Both of the options are technologically feasible.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The most recent ROC BACT listings for Diesel emergency engines in this size range are summarized in Table C-3.6. The most stringent ROC limit in these recent BACT determinations is a 0.07 gm/hp-hr limit, based on the certified engine family emissions for a Tier 2 engine. However, it is clear from SCAQMD's BACT documentation that SCAQMD's BACT determination is actually compliance with Tier 2, and not the specific ROC emission rate listed in the BACT document. This is made clear by the fact that SCAQMD's general guidance, issued four years after the permit in questions, specifies that BACT for ROC for all emissions from an emergency engine is compliance with Tier 3 limits. For this reason, it can be concluded that the District did not consider 0.07 gm/hp-hr to be a BACT limit in 2002; rather, it considered compliance with Tier 2 limits to be BACT. The most stringent ROC limit in these recent BACT determinations is a 0.14 gm/hp-hr limit, based on compliance with applicable EPA Tier 4 (final) standards and the federal NSPS Subpart IIII.

Table C-3.6
Recent ROC BACT Determinations for Emergency Compression-Ignition Engines

Facility	District	ROC Limit[a,b]	Control Method Used	Date Permit Issued	Source
Power Systems	SCAQMD	0.07 (Certification)	Engine Designed to meet EPA Tier 2	8/29/2002	SCAQMD BACT (A/N 392543)
General Guidelines	SCAQMD	3.0 (Tier 3 limit)	Engine Designed to meet EPA Tier 3	7/14/2006	SCAQMD guidelines for non-major facilities
BACT Handbook	BAAQMD	None		12/22/2010	BAAQMD BACT guideline 96.1.3
BACT Guidelines	SJVAPCD	3.0 (Tier 3 limit)	Engine Designed to meet EPA Tier 3	9/10/2013	SJVAPCD BACT Guideline 3.1.1
Energy Answers Arecibo	Puerto Rico	0.15	Engine Design	4/10/2014	EPA RBL Clearinghouse
EPA Tier 4 (final)		0.14	Engine Design		40 CFR 1039.101
AQMD Prohibitory Rule	Rule 74.9.B.1	80 ppm	Not Specified	11/78/05	VCAPCD Rule 74.9
Federal NSPS	Subpart IIII	0.14	Engine Designed to meet EPA Tier 4		40 CFR 60.4205

Note:
a. All concentrations expressed as grams per horsepower-hour
b. For Tier 2 and Tier 3 limits, values are for NOx + NMHC. The NMHC fraction is often assumed to be 5% of the sum of NOx +NMHC.

Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

The most stringent limit in Table C-3.6 is the EPA Tier 4 (final) limit. Engine manufacturers are using a combination of techniques, including incorporation of exhaust control devices as part of the basic engine, to achieve this limit. For this reason, an engine capable of achieving EPA Tier 4 limits is the most effective control technology considering environmental, energy, and cost impacts.

Step 5 – Determine BACT/Present Conclusions

BACT must be at least as stringent as the most stringent level achieved in practice, federal NSPS, or district prohibitory rule. Based upon the results of this analysis, the ROC emission rate of 0.14 gm/hp-hr required to meet EPA Tier 4 (final) requirements is BACT. No more stringent level has been suggested as being technologically feasible. Therefore, BACT/LAER for ROC for this application is any technology capable of achieving 0.14 gm/hp-hr.

The engine selected for this project is equipped with advanced combustion controls, and is certified to meet Tier 4 (final) standards, and therefore complies with BACT for ROC.

SULFUR OXIDE EMISSIONS

Step 1 – Identify All Possible Control Technologies

Listed below are the technologies for control of NOx that were identified as a result of review of sources of BACT determinations.

- Use of CARB Diesel Fuel (Ultra Low Sulfur Diesel Fuel) (fuel sulfur content less than 15 ppm (wt)).

Step 2 – Eliminate Technically Infeasible Options

All of the control options discussed above are technically feasible.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Only one control method was identified.

Step 4 – Evaluate Most Effective Controls and Document Results

The use of CARB Diesel Fuel has been achieved in practice at numerous diesel engines throughout the state, and the use of this fuel minimizes SOx emissions.

Step 5 – Determine BACT/Present Conclusions

BACT for this project is the use of CARB Diesel Fuel (Ultra Low Sulfur Diesel Fuel) (fuel sulfur content less than 15 ppm (wt)). The project will use this fuel, and thus will meet BACT.

PM/PM_{10}/$PM_{2.5}$ EMISSIONS

Step 1 – Identify All Possible Control Technologies

Listed below are the technologies for control of PM (PM_{10}/$PM_{2.5}$) that were identified as a result of review of sources of BACT determinations.

- Use of ultra low sulfur Diesel fuel in an engine designed to meet Tier 4 (final) emission levels. Use of this fuel is required by regulation; this is the baseline technology for determining BACT.

- Use of ultra low sulfur Diesel fuel plus Diesel oxidation catalyst (DOC): This is an add-on control technology that oxidizes organic aerosols by reaction with the oxygen in the exhaust in the presence of a catalyst. EPA estimates that DOC technology can result in a 20 percent reduction in PM.[12]
- Use of ultra low sulfur Diesel fuel plus catalyzed Diesel particulate filter (CDPF): This is an add-on control technology that use filters to capture Diesel particulate, then oxidizes particulate in the filters. EPA estimates that CDPF technology can result in a 90 percent reduction in PM.[13]

Step 2 – Eliminate Technologically Infeasible Options

All of the options are technologically feasible.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

The most recent PM BACT listings for Diesel emergency engines in this size range are summarized in Table C-3.7. The most stringent PM limit in these recent BACT determinations is a 0.02 gm/hp-hr limit, based on the certified engine family emissions for a Tier 4 (final) engine.

[12] EPA, *Diesel Retrofit Technology, An Analysis of the Cost-Effectiveness of Reducing Particulate Matter and Nitrogen Oxides Emissions from Heavy-Duty Nonroad Diesel Engines Through Retrofits*, p. 5.
[13] EPA, *Diesel Retrofit Technology, An Analysis of the Cost-Effectiveness of Reducing Particulate Matter and Nitrogen Oxides Emissions from Heavy-Duty Nonroad Diesel Engines Through Retrofits*, p. 5.

Table C-3.7
Recent PM BACT Determinations for Emergency Compression-Ignition Engines

Facility	District	PM Limit[a]	Control Method Used	Date Permit Issued	Source
Power Systems	SCAQMD	0.07 (Certification)	Engine Designed to meet EPA Tier 2	8/29/2002	SCAQMD BACT (A/N 392543)
General Guidelines	SCAQMD	0.15 (Tier 3 limit)	Engine Designed to meet EPA Tier 3	7/14/2006	SCAQMD guidelines for non-major facilities
BACT Handbook	BAAQMD	0.15	Not	12/22/2010	BAAQMD BACT guideline 96.1.3
BACT Guidelines	SJVAPCD	0.15	Not specified	9/10/2013	SJVAPCD BACT Guideline 3.1.1
Energy Answers Arecibo	Puerto Rico	0.15	Engine Design	4/10/2014	EPA RBL Clearinghouse
EPA Tier 4 (final)		0.02	Engine Design		40 CFR 1039.101
AQMD Prohibitory Rule	Rule 74.9.B.1	none	Not Specified	11/78/05	VCAPCD Rule 74.9
Federal NSPS	Subpart IIII	0.02	Engine Designed to meet EPA Tier 4 (final)		40 CFR 60.4205

Note:
a. All concentrations expressed as grams per horsepower-hour

Step 4 – Evaluate the Most Effective Control Technology Considering Environmental, Energy, and Cost Impacts

The most stringent limit in Table C-3.7 is the EPA Tier 4 (final) limit. Engine manufacturers are using a combination of techniques, including incorporation of exhaust control devices as part of the basic engine, to achieve this limit. For this reason, an engine capable of achieving EPA Tier 4 (final) limits is the most effective control technology considering environmental, energy, and cost impacts.

Step 5 – Determine BACT/Present Conclusions

BACT must be at least as stringent as the most stringent level achieved in practice, federal NSPS, or district prohibitory rule. Based upon the results of this analysis, the PM emission rate of 0.02 gm/hp-hr required to meet EPA Tier 4 (final) requirements is BACT. No more stringent level has been suggested as being technologically feasible. Therefore, BACT/LAER for PM for this application is any technology capable of achieving 0.02 gm/hp-hr.

The engine selected for this project is equipped with advanced combustion controls, and is certified to meet Tier 4 (final) standards, and therefore complies with BACT for PM.

SUMMARY

Proposed BACT determinations for the P3 Diesel emergency generator engine are summarized in Table C-3.8.

Table C-3.8

Proposed BACT Determinations for P3 Diesel Emergency Generator Engine

Pollutant	Proposed BACT Determination
Nitrogen Oxides	Engine designed to meet Tier 4 (final) standards.
Sulfur Dioxide	Use of CARB Diesel Fuel.
ROC	Engine designed to meet Tier 4 (final) standards.
PM_{10}	Engine designed to meet Tier 4 (final) standards.

APPENDIX C-4

AIR QUALITY MODELING PROTOCOL

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research

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February 19, 2015

Kerby E. Zozula
Manager Engineering Division
Ventura County APCD
669 County Square Drive
Ventura, CA 93003

Subject: Revised Modeling Protocol for the Puente Power Project

Dear Mr. Zozula:

On behalf of NRG Oxnard Energy Center LLC (NRG), Sierra Research is pleased to submit the enclosed revised modeling protocol for the proposed Puente Power Project. This protocol was updated based on recent comments provided by the District. The following is a summary of the changes made to the modeling plan:

- The NO_2/NOx ratios for the new gas turbine have been updated to reflect information provided recently by the gas turbine vendor (30% ratio during normal operation, 40% ratio during startups/shutdowns/commissioning).
- The NO_2/NOx ratio for determining annual average NO_2 impacts was changed from a default of 75% to 80% based on guidance provided by the San Joaquin Valley APCD (providing technical support on this project).
- Because we do not expect any complex terrain modeling issues for this project, the references to the use of the CTDMPLUS model have been removed.
- While not required under the VCAPCD New Source Review (NSR) regulations, because the project will be undergoing a CEQA review as part of the CEC permitting process, we will perform air quality modeling on both the new units and existing Unit 3 at the facility (the existing emergency Diesel generator and firepump engines will be shutdown). We will show these modeled impacts separately.
- For the screening level risk assessment, we have included the fish water pathway option to the HARP modeling inputs (along with the options for home grown produce, dermal absorption, soil ingestion, and mother's milk).
- The reference to a hybrid partial dry cooling system has been removed from the document (the project will only use dry cooling).
- The maximum impacts on the proposed North Shore of Mandalay project will be included in the analysis.
- The NOx emission rates for the new and existing Unit 3 are summarized on the enclosed sheet.

If you have any questions or need any additional information, please do not hesitate to contact me at 916-273-5139 or George Piantka at 760-710-2156.

Sincerely,

Gabriel C. McAuliffe

for Tom Andrews

Enclosure

cc: Leland Villalvazo, SJVAPCD

Summary of NOx Emissions (for new/existing equipment)

1. New gas turbine: NOx emissions during normal operation based on a BACT NOx level of 2.5 ppmvd @ 15% O2 (0.0091 lbs/MMBtu). At a maximum heat input of approximately 2,582 MMBtu/hr (HHV), this results in a maximum normal operation hourly NOx emission rate of approximately 23 lbs/hr. There are high NOx emissions during gas turbine startups/shutdowns/commissioning that will be discussed/analyzed in the permit application package submitted to the District.
2. New Diesel generator engine: NOx emissions based on an EPA Tier 4 (final) non-road engine (generator engines) certification standard of 0.50 g/bhp-hr. At a maximum engine rating of approximately 779 hp, this results in a maximum hourly NOx emission rate of approximately 0.9 lbs/hr.
3. Existing Unit 3 gas turbine: NOx emissions based on the Title V permit limit of 1104 lbs/hr.

Air Dispersion Modeling and Health Risk Assessment Protocol

Puente Power Project
Oxnard, California

Submitted to:

Ventura County Air Pollution Control District
(for an Application for an Authority to Construct/ Determination of Compliance)

California Energy Commission
(for an Application for Certification)

prepared for:

NRG Energy Center Oxnard LLC

February 2015

prepared by:

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Air Dispersion Modeling and Health Risk Assessment Protocol
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February 2015

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Air Dispersion Modeling and Health Risk Assessment Protocol
Puente Power Project

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1. INTRODUCTION

This protocol describes the modeling procedures that will be used to determine the ambient air impacts from the Puente Power Project (also referred to herein as "PPP" or "the Project"). These procedures will be used in the ambient air quality impact assessment and screening health risk assessment that will be submitted to the Ventura County Air Pollution Control District (VCAPCD, or District) as part of an application for Final Determination of Compliance and Authority to Construct, and to the California Energy Commission as part of an Application for Certification.

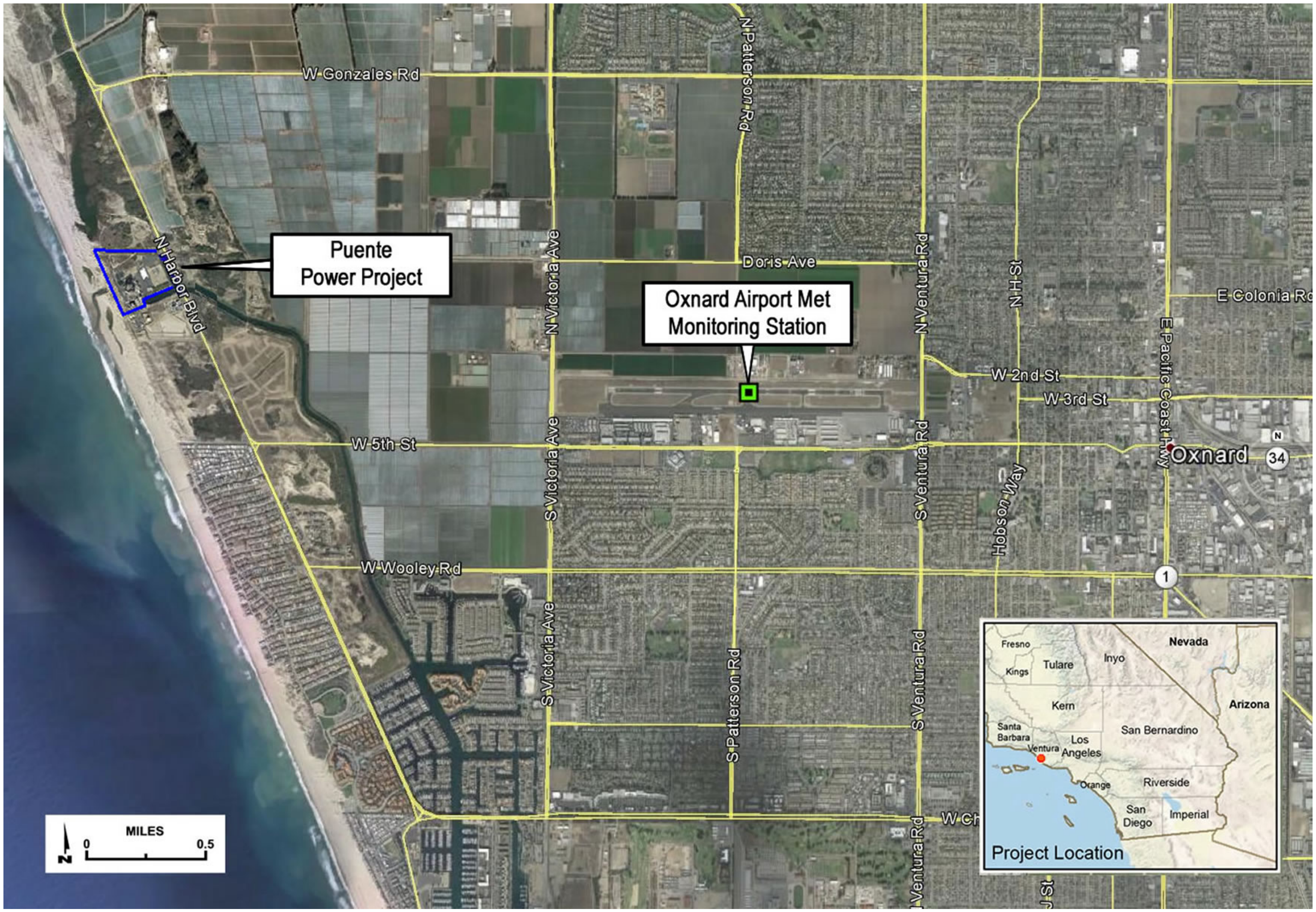
2. FACILITY DESCRIPTION AND SOURCE INFORMATION

The Puente Power Project ("PPP" or Project) will consist of replacing existing Units 1 and 2 (1,990 MMBtu/hr each, 215 MW each, natural gas fired boilers) with a new natural gas fired H-Class simple-cycle combustion turbine generator (approximately 2,500 MMBtu/hr, 275 MW), replacing the existing Diesel emergency generator will a new engine, and the shutdown of the existing Diesel emergency fire pump engine. The remainder of the facility will remain unchanged: one natural gas fired peaker combustion turbine (Unit 3), and ancillary facilities. PPP is located in the City of Oxnard, within Ventura County. Figure 1 shows the general location of the Project.

The proposed new combustion turbine generator will be equipped with Best Available Control Technology (BACT). BACT will include dry low-NOx combustion, selective catalytic reduction (SCR), oxidation catalysts, and use of clean-burning natural gas fuel. The operating schedule for the new unit will vary and may range from no operation during the winter months to potentially 24 hours of operation per day during the summer months. The modeling analysis will be performed for the worst-case (maximum expected equipment operation) operating hour, operating day, and operating year. The modeling analysis will include a complete description of the new equipment, including the worst-case hourly, daily, and annual operating schedules used for the analysis.

The Proposed Project is not expected to trigger Prevention of Significant Deterioration (PSD) review for criteria pollutants.

Figure 1
Location of the Proposed Project



3. DISPERSION MODELING PROCEDURES

The air quality modeling analysis will follow the March 2009 U.S. Environmental Protection Agency (USEPA) AERMOD Implementation Guide (USEPA, 2009) and USEPA's "Guideline on Air Quality Models" (USEPA, 2005).

3.1 AERMOD Modeling

The following USEPA air dispersion models are proposed for use to quantify pollutant impacts on the surrounding environment based on the emission sources' operating parameters and their locations:

- American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee (AERMIC) model, also known as AERMOD (Version 14134);
- Building Profile Input Program – Plume Rise Model Enhancements (BPIP-PRIME, Version 04274); and
- SCREEN3 (Version 13043).

The main air dispersion modeling will be conducted with the latest version of AERMOD, USEPA's preferred/recommended dispersion model for new source review and PSD air quality impact assessments. AERMOD can account for building downwash effects on dispersing plumes. Stack locations and heights and building locations and dimensions will be input to BPIP-PRIME. The first part of BPIP-PRIME determines and reports on whether a stack is being subjected to wake effects from a structure or structures; the second part calculates direction-specific building dimensions for each structure, which are used by AERMOD to evaluate wake effects. The BPIP-PRIME output is formatted for use in AERMOD input files.

AERMOD requires hourly meteorological data consisting of wind direction and speed (with reference height), temperature (with reference height), Monin-Obukhov length, surface roughness length, heights of the mechanically and convectively generated boundary layers, surface friction velocity, convective velocity scale, and vertical potential temperature gradient in the 500-meter layer above the planetary boundary layer.

Standard AERMOD control parameters will be used, including stack tip downwash, non-screening mode, non-flat terrain, and sequential meteorological data check. The stack-tip downwash algorithm will be used to adjust the effective stack height downward following the methods of Briggs (1972) for cases where the stack exit velocity is less than 1.5 times the wind speed at stack top. The rural option will be used by not invoking the URBANOPT option.[1]

3.1.1 Ambient Ratio Method and Ozone Limiting Method

Annual nitrogen dioxide (NO_2) concentrations will be calculated using the Ambient Ratio Method (ARM), originally adopted in Supplement C to the Guideline on Air Quality Models (USEPA, 1995) with a revision issued by USEPA in March 2011 (USEPA, 2011a). Based on guidance provided by the San Joaquin Valley Air Pollution Control District (will be providing technical and modeling support for this project), a default of 80% will be used for the conversion of nitric oxide (NO) to NO_2 on an annual basis and the calculation of NO_2/NOx (nitrogen oxide) ratios.

If NO_2 concentrations need to be examined in more detail, the Ozone Limiting Method (OLM) (Cole and Summerhays, 1979), implemented through the "OLMGROUP ALL" option in AERMOD (USEPA, 2011a), will be used. AERMOD OLM will be used to calculate the NO_2 concentration based on the OLM method and hourly ozone data. Contemporaneous hourly ozone data collected at the nearby Oxnard (Rio Mesa School) monitoring station will be used in conjunction with OLM to calculate hourly NO_2 concentrations from modeled hourly NOx concentrations.

Part of the NOx in the gas turbine exhaust is converted to NO_2 during and immediately after combustion. The remainder of the NOx emissions is assumed to be in the form of NO. For the new gas turbine, we will use the NO_2/NOx ratios for the OLM analysis (discussed in more detail below) provided by the turbine vendor (30% during normal operating hours, 40% during startup/shutdown periods, and 40% during commissioning tests when SCR is not fully operational). These same ratios will be used for modeling the existing Unit 3 turbine. For the new emergency generator engine, we will use the NO_2/NOx ratios listed in the USEPA's In-Stack Ratio (ISR) database for the make/model engine in question (or similar make/model engine if the exact engine is not listed in the database).[2]

As the exhaust leaves the stack and mixes with the ambient air, the NO reacts with ambient ozone (O_3) to form NO_2 and molecular oxygen (O_2). The OLM assumes that at any given receptor location, the amount of NO that is converted to NO_2 by this oxidation reaction is proportional to the ambient O_3 concentration. If the O_3 concentration is less than the NO concentration, the amount of NO_2 formed by this reaction is limited. However, if the O_3 concentration is greater than or equal to the NO concentration, all of the NO are assumed to be converted to NO_2.

[1] The rural vs. urban option in AERMOD is primarily designed to set the fraction of incident heat flux that is transferred into the atmosphere. This fraction becomes important in urban areas having an appreciable "urban heat island" effect due to a large presence of land covered by concrete, asphalt, and buildings. This situation does not exist for the project site.
[2] USEPA's ISR database is at *http://www.epa.gov/ttn/scram/no2_isr_database.htm*.

A detailed discussion of OLM modeling and how OLM modeling results and monitored background NO_2 will be combined is provided in Sections 3.6.3 and 3.6.4.

3.1.2 $PM_{2.5}$

$PM_{2.5}$ impacts will be modeled in accordance with USEPA guidance (USEPA, 2010a)[3]. A detailed discussion of how modeled $PM_{2.5}$ impacts will be evaluated is provided in Section 3.6.

3.2 Fumigation Modeling

The SCREEN3 model will be used to evaluate inversion breakup fumigation and shoreline fumigation impacts for short-term averaging periods (24 hours or less), as appropriate. The methodology in "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised" (USEPA, 1992b) will be followed for these analyses. Combined impacts for all sources under fumigation conditions will be evaluated, based on USEPA modeling guidelines.

3.3 Health Risk Assessment Modeling

A health risk assessment (HRA) will be performed according to California Air Resources Board (CARB) guidance. The HRA modeling will be prepared using CARB's Hotspots Analysis and Reporting Program (HARP) computer program (Version 1.4f, May 2012[4] using the latest HARP Health Database table updated in November 2013) and AERMOD with the CARB "on-ramp."[5] HARP will be used to assess cancer risk as well as non-cancer chronic and acute health hazards.

3.4 Meteorological Data

Meteorological data are required from two different types of monitoring locations: surface data that are representative of meteorological conditions near the earth, and upper air data that are representative of meteorological conditions well above the earth's surface.

A five-year meteorological dataset (2009–2013) will be processed in AERMET (Version 14134) to generate AERMOD-compatible meteorological data for air dispersion

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[3] While there is a May 20, 2014 EPA guidance regarding secondary $PM_{2.5}$ formation, this guidance was not cited because it is specific to projects that trigger PSD review which is not the case for the Proposed Project.

[4] OEHHA has issued new draft guidance for screening health risk assessments. If the draft guidance is finalized and the new health risk screening procedures are incorporated into a new version of HARP before the AFC is submitted, the new version of HARP will be used for the HRA.

[5] HARP has not yet been revised to utilize AERMOD, but CARB has developed "on-ramp" software that allows HARP to incorporate AERMOD output files. Therefore, HARP is now compatible with AERMOD.

modeling. VCAPCD has contracted with the San Joaquin Valley Air Pollution Control District (SJVAPCD) to provide technical and modeling support for this project, and the SJVAPCD will prepare the meteorological data that we will use for the modeling analysis. This data will be processed using the ADJ_U* option, and the AERMOD modeling will use the "beta" option to be compatible with the processed meteorological data.[6] The meteorological dataset will include surface meteorological data recorded at the nearby Oxnard Airport monitoring station and upper air data recorded at Vandenberg AFB. Figure 1 above shows the relative locations of the project site and the meteorological monitoring station at the Oxnard Airport. The Oxnard Airport monitoring station was chosen by the SJVAPCD and is less than 3 km (less than 2 miles) from the project site. USEPA defines the term "on-site data" to mean data that would be representative of atmospheric dispersion conditions at the source and at locations where the source may have a significant impact on air quality. Specifically, the meteorological data requirement originates in the Clean Air Act at Section 165(e)(1), which requires an analysis "of the ambient air quality at the proposed site and in areas which may be affected by emissions from such facility for each pollutant subject to regulation under [the Act] which will be emitted from such facility."

This requirement and USEPA's guidance on the use of on-site monitoring data are also outlined in the "On-Site Meteorological Program Guidance for Regulatory Modeling Applications" (USEPA, 1987a). The representativeness of the data depends on (a) the proximity of the meteorological monitoring site to the area under consideration, (b) the complexity of the topography of the area, (c) the exposure of the meteorological sensors, and (d) the period of time during which the data are collected.

Representativeness has also been defined in "The Workshop on the Representativeness of Meteorological Observations" (Nappo et. al., 1982) as "the extent to which a set of measurements taken in a space-time domain reflects the actual conditions in the same or different space-time domain taken on a scale appropriate for a specific application." Representativeness is best evaluated when sites are climatologically similar, as are the project site and the Oxnard Airport meteorological monitoring station.

Representativeness has additionally been defined in the PSD Monitoring Guideline (USEPA, 1987b) as data that characterize the air quality for the general area in which the Proposed Project would be constructed and operated. Because of the close proximity of the Oxnard Airport meteorological data site to the project site (the distance between the two locations is less than two miles), the same large-scale topographic features that influence the meteorological data monitoring station also influence the project site in the same manner.

[6] According to the discussion at the following link, the default AERMET u* formulation under predicts surface friction velocity (u*) at low wind speeds by approximately a factor of 2.
http://www.cleanairinfo.com/regionalstatelocalmodelingworkshop/archive/2013/Files/Presentations/Tuesday/105-Review_of_AERMOD_Low_Wind_Speed_Options_Paine.pdf
The beta "ADJ_U*" option in AERMET adjusts the u* at low wind speeds based on the following methodology: Qian and Venkatram, "Performance of Steady-State Dispersion Models Under Low Wind-Speed Conditions," Boundary-Layer Meteorology (2011) 138:475–491.

There are few locations where upper air data are available; when looking at the representativeness of upper air data, the most important factors are distances relative to large urbanized areas and coastal zones. The Vandenburg Air Force Base upper air monitoring station was selected because it is the nearest station with complete and representative upper air data for the five-year period. The Vandenburg monitoring station is located in the coastal zone, approximately 137 km (85 miles) from the project site, and in a relatively rural area.

Thus, we agree with the SJVAPCD that the meteorological data from these monitoring stations are representative of conditions at the Project site.

3.5 Receptor Grids

Receptor and source base elevations will be determined from USGS National Elevation Dataset (NED) data in the GeoTIFF format at a horizontal resolution of 1 arc-second (approximately 30 meters). All coordinates will be referenced to UTM North American Datum 1983 (NAD83), Zone 11. The AERMOD receptor elevations will be interpolated among the DEM nodes according to standard AERMAP procedure. For determining concentrations in elevated terrain, the AERMAP terrain preprocessor receptor-output (ROU) file option will be chosen.

Cartesian coordinate receptor grids will be used to provide adequate spatial coverage surrounding the project area for assessing ground-level pollution concentrations, to identify the extent of significant impacts, and to identify maximum impact locations. A 250-meter resolution coarse receptor grid will be developed and will extend outwards at least 10 km (or more if necessary to establish the significant impact area).

For the full impact analyses, a nested grid will be developed to fully represent the maximum impact area(s). The receptor grid will be constructed as follows:

1. One row of receptors spaced 25 meters apart along the facility's fence line;

2. Four tiers of receptors spaced 25 meters apart, extending 100 meters from the fence line;

3. Additional tiers of receptors spaced 100 meters apart, extending from 100 meters to 1,000 meters from the fenceline; and

4. Additional tiers of receptors spaced 250 meters apart, out to at least 10 km from the most distant source modeled, not to exceed 50 km from the project site.

Additional refined receptor grids with 25-meter resolution will be placed around the maximum first-high or maximum second-high coarse grid impacts and extended out 1,000 meters in all directions. Concentrations within the facility fenceline will not be calculated.

3.6 Ambient Air Quality Impact Analyses (AQIA)

Emissions from the Proposed Project will result from combustion of fuel in the gas new turbine and new emergency generator engine. These emission sources will be modeled as point sources. The expected emission rates will be based on vendor data and additional conservative assumptions of equipment performance.

The purpose of the ambient air quality impact analysis is to demonstrate compliance with applicable ambient air quality standards. Both USEPA and the District have regulations that prohibit construction of a project that will cause or contribute to violations of applicable standards.

Based on USEPA guidance, if, for a given pollutant and averaging time, the project's impact is below the Significant Impact Levels (SILs) shown in Table 1, the project's impact is deemed to be de minimis, and no further analysis is required. However, if the modeled impacts exceed any of the significance thresholds displayed in Table 1, the project has the potential to cause or contribute to a violation of the ambient air quality standard at the times and locations where the threshold is exceeded. In that case, the analysis must consider the contribution of other sources to the ambient concentration. If the analysis indicates that there will be a violation of an ambient air quality standard, and the project's impact at the time and place of the violation is significant, then the project may not be approved unless the project's impact is reduced.

Table 1
Significant Impact Levels for Air Quality Impacts in Class II Areas ($\mu g/m^3$)

Pollutant	Averaging Period				
	Annual	24-hour	8-hour	3-hour	1-hour
NO_2	1	--	--	--	7.5[a]
SO_2	1	5	--	25	7.8[b]
CO	--	--	500	--	2000
PM_{10}	1	5	--	--	--
$PM_{2.5}$[c]	0.3	1.2	--	--	--

a. USEPA has not yet defined SILs for one-hour NO_2 and SO_2 impacts. However, USEPA has suggested that, until SILs have been promulgated, interim values of 4 ppb (7.5 $\mu g/m^3$) for NO_2 and 3 ppb (7.8 $\mu g/m^3$) for SO_2 may be used (USEPA (2010c); USEPA (2010d)). These values will be used in this analysis as interim SILs.

b. USEPA (2010e), p. 64891.

c. In January 2013, the D.C. Circuit Court of Appeals ruled that the $PM_{2.5}$ SILs could not be used as a definitive exemption from the requirements to perform $PM_{2.5}$ preconstruction monitoring or a $PM_{2.5}$ increments analysis or AQIA. However, USEPA's March 2013 interpretation of the Court's decision indicated that the SILs can be used as guidance.

An air quality impact analysis is required for certification by the CEC and to support the air quality impact analysis and screening HRA that are required by the District. Each agency has its own criteria for preparation of the air quality impact analysis; however, the criteria used by the CEC and the District are similar enough that the same basic analysis, with some variations, will satisfy both agencies.

3.6.1 Step 1: Project Impact

The first step in the compliance demonstration is to determine, for each pollutant and averaging period, whether the proposed new equipment for the project has the potential to cause a significant ambient impact at any location, under any operating or meteorological conditions. As indicated in the NSR Workshop Manual,[7] "[i]f the significant net emissions increase from a proposed source would not result in a significant ambient impact anywhere, the application is usually not required to go beyond a preliminary analysis in order to make the necessary showing of compliance for a particular pollutant." The USEPA significance levels for air quality impacts are shown in Table 1. If the maximum modeled impact for any pollutant and averaging period is below the appropriate significance level in this table, no further analysis is necessary.[8]

Based on the following USEPA (2010e) guidance, no further analysis is necessary for any location where the modeled impacts from the project alone are below the significance thresholds.

> *The primary purpose of the SILs is to identify a level of ambient impact that is sufficiently low relative to the NAAQS or increments that such impact can be considered trivial or de minimis. Hence, the EPA considers a source whose individual impact falls below a SIL to have a de minimis impact on air quality concentrations that already exist. Accordingly, a source that demonstrates that the projected ambient impact of its proposed emissions increase does not exceed the SIL for that pollutant at a location where a NAAQS or increment violation occurs is not considered to cause or contribute to that violation. In the same way, a source with a proposed emissions increase of a particular pollutant that will have a significant impact at some locations is not required to model at distances beyond the point where the impact of its proposed emissions is below the SILs for that pollutant. When a proposed source's impact by itself is not considered to be "significant," EPA has long maintained that any further effort on the part of the applicant to complete a cumulative source impact analysis involving other source impacts would only yield information of trivial or no value with respect to the required evaluation of the proposed source or modification.*[9]

[7] USEPA (1990), p. C.51.
[8] With the potential exception of the $PM_{2.5}$ SILs. See USEPA (2010e), p. 64891.
[9] USEPA (2010e), p. 64891.

For $PM_{2.5}$, the highest average of the maximum annual averages and of the 24-hour averages modeled over the five years of meteorological data will be compared with the SILs in Table 1 to determine whether the modeled $PM_{2.5}$ project impacts are significant.[10] For other pollutants, the highest modeled concentrations will be compared with the SILs.

For pollutants with modeled project impacts below the significance thresholds, a summary table will show the maximum modeled project impacts plus background concentrations. Although this information is not required by federal modeling guidance, it will be provided as part of the CEQA analysis.

<u>3.6.2 Step 2: Project Plus Background</u>

Pollutants/averaging periods that are not screened out in Step 1 are required to undergo a full air quality impact analysis. In Step 2, the ambient impacts of the project are modeled and added to background concentrations. The results are compared to the relevant state and federal ambient standards.

The second step of the compliance demonstration is required to show that the proposed new project, in conjunction with existing sources, will not cause or contribute to a violation of any ambient air quality standard. As discussed in more detail below, the impacts of existing sources are represented by the existing ambient air quality data collected at the monitoring stations shown in Table 2. In accordance with Section 8.2.1 of Appendix W to 40 CFR Part 51:

> *Background concentrations are an essential part of the total air quality concentration to be considered in determining source impacts. Background air quality includes pollutant concentrations due to: (1) Natural sources; (2) nearby sources other than the one(s) currently under consideration; and (3) unidentified sources. Typically, air quality data should be used to establish background concentrations in the vicinity of the source(s) under consideration.*

If a Step 2 analysis is required, the modeled impacts from the Proposed Project along with the impacts from the continued operation of existing Unit 3 will be added to the representative background concentration for comparison with the California and National Ambient Air Quality Standards (CAAQS and NAAQS). In accordance with USEPA guidelines,[11] the highest second-highest modeled concentrations will be used to demonstrate compliance with the short-term federal standards (except for the statistically based federal one-hour NO_2 and SO_2, and 24-hour $PM_{2.5}$, standards) and the highest modeled concentration will be used to demonstrate compliance with the federal annual standards and all state standards. If the predicted total ground-level concentration is below the state or federal ambient air quality standard for each pollutant and averaging period, no further analysis is required for that pollutant and averaging period.

[10] USEPA (2010a), p. 6.
[11] USEPA (2005), 11.2.3.2 and 11.2.3.3

3.6.3 Compliance with Statistically Based Standards

For the one-hour average federal NO_2 standard for the District and CEC analyses, the comparison of impacts with the new federal one-hour standard will be done in accordance with Appendix W of Part 51 of Title 40 of the CFR "Guideline on Air Quality Models" and the tiered process presented in the CAPCOA guidance document "Modeling Compliance of the Federal 1-Hour NO_2 NAAQS" (CAPCOA, 2011), together with clarification as provided by the 2011 Tyler Fox memorandum (USEPA, 2011a) and the September 30, 2014 clarification memo (USEPA, 2014c). Appendix W of Part 51 of Title 40 of the CFR "Guideline on Air Quality Models" has codified three methods that can be used to estimate NO_2 concentration (Tier 1 - Total Conversion, Tier 2 - Ambient Ratio Method or ARM, Tier 3 - Ozone Limiting Method or OLM). According to USEPA guidance (USEPA, 2011a):

> *While the limited scope of the available field study data imposes limits on the ability to generalize conclusions regarding model performance, these preliminary results of hourly NO_2 predictions for Palau and New Mexico show generally good performance for the PVMRM and OLM/OLMGROUP ALL options in AERMOD. We believe that these additional model evaluation results lend further credence to the use of these Tier 3 options in AERMOD for estimating hourly NO_2 concentrations, and we recommend that their use should be generally accepted provided some reasonable demonstration can be made of the appropriateness of the key inputs for these options, the in-stack NO_2/NOx ratio and the background ozone concentrations.*[12]

As discussed above, for the new gas turbine the in-stack NO_2/NOx ratios will be based on information provided by the turbine vendor. Background ozone concentrations in the project area will be represented by five years of ozone data (2009–2013) collected at Oxnard concurrently with the meteorological data. Based on these factors, we propose to use the Tier 3, "OLMGROUP ALL," option for modeling 1-hour NO_2 concentrations.

For demonstrating compliance with the statistically based federal one-hour NO_2 standard, CAPCOA's 2011 guidance document (CAPCOA, 2011) provides 11 progressively more sophisticated methods for combining modeled NO_2 concentrations with background (or monitored) NO_2. These methods, outlined below, were developed to allow demonstration of compliance using the lowest amount of resources necessary. Each tier is a progressively more sophisticated and comprehensive analysis that reduces the level of conservatism without reducing the level of assurance of compliance.

1. Significant Impact Level (SIL) – no background required
2. Max modeled value + max monitored value

[12] The Plume Volume Molar Ratio Method (PVMRM) is considered by USEPA to be a Tier 3 screening method, similar to OLM. (USEPA, 2011a).

3. Max modeled value + 98th pctl monitored value
4. 8th highest modeled value + max monitored value
5. 8th highest modeled value + 98th pctl monitored value
6. (5 yr avg of 98th pctl modeled value) + max monitored value
7. (5 yr avg of 98th pctl of modeled value) + 98th pctl monitored value
8. 5 yr avg of 98th pctl of (modeled value + monthly hour-of-day – 1st high)
9. 5 yr avg of 98th pctl of (modeled value + seasonal hour-of-day – 3rd high)
10. 5 yr average of 98th pctl of (modeled value + annual hour-of-day - 8th high)
11. Paired-Sum: 5 yr avg of 98th pctl of (modeled value + background)

Applicable definitions are provided below.

- *Significant Impact Level (SIL)* is defined as a de minimis impact level below which a source is presumed not to cause or contribute to an exceedance of a NAAQS (see Table 1 above).

- *Max modeled value* is defined as the maximum concentration predicted by the model at any given receptor in any given year modeled.

- *8th highest modeled value* is defined as the highest 8th-highest concentration derived by the model at any given receptor in any given year modeled.

- *5 yr avg of the 98th pctl* is defined as the highest of the average 8th highest (98th percentile) concentrations derived by the model across all receptors based on the length of the meteorological data period or the X years average of 98th percentile of the annual distribution of daily maximum one-hour concentrations across all receptors, where X is the number of years modeled. (In Appendix W, USEPA recommends using five years of meteorological data from a representative National Weather Service site or one year of on-site data.)

- *Monthly hour-of-day* is defined as the three-year average of the 1st highest concentrations (Maximum Hourly) for each hour of the day.

- *Seasonal Hour-Of-Day* is defined as the three-year average of the 3rd highest concentrations for each hour of the day and season.

- *Annual hour-of-day* is defined as the three-year average of the 8th highest concentration for each hour of the day.

- *Paired-Sum* **(**5 yr avg of the 98th pctl) is the merging of the modeled concentration with the monitored values paired together by month, day, and hour. The sum of the paired values is then processed to determine the X-year average of the 98th percentile of the annual distribution of daily maximum one-hour concentrations across all receptors, where X is the number of years modeled.

For the demonstration of compliance with the federal one-hour NO_2 standard, we will perform analyses at as many of the following tiers as are needed to demonstrate compliance with the state and federal ambient air quality standards: Tier 1, Tier 2, Tier 7, Tier 8, Tier 9, Tier 10, and Tier 11. Hourly NO_2 background data (for the same five years of meteorological data used for the modeling—2009 to 2013) may also be used in order to refine the NAAQS analysis both spatially and temporally. Tiers 8 and 11 will be the two primary approaches used for this modeling. Tier 8 will be used first to assess project impacts (monthly hour of day approach using 5-year average (2009~2013) month hour of day ozone data and 3-year average (2011~2013) month hour of day NO_2 data). If the impacts from the Tier 8 approach are above regulatory thresholds, the Tier 11 will be applied using the 5-year (2009~2013) concurrent ozone and NO_2 data approach. This analysis will include both the proposed new unit/new emergency generator engine and continued operation of existing Unit 3. In addition, to account for recently permitted nearby stationary sources that are not reflected in the background NO_2 data, we will review the list of projects provided by the VCAPCD (the request for these projects is discussed in Section 3.10) and model the impacts from projects with a NOx net emission increase greater than 5 tons/year (excluding intermittently operated equipment per USEPA guidance).[13]

The demonstration of compliance with the federal one-hour SO_2 standard will follow the same steps, except that it will utilize the 99th percentile predicted one-hour average SO_2 concentrations instead of the 98th percentile.

For the 24-hour average federal $PM_{2.5}$ standard for the District and CEC analyses, the comparison of impacts with the federal 24-hour average standard will be done in accordance with USEPA March 23, 2010 guidance (USEPA, 2010a). This guidance calls for basing the initial determination of compliance with the standard on the five-year average of the highest modeled annual and 24-hour averages, combined with background concentrations based on the form of the standards (the three-year average of the annual $PM_{2.5}$ concentrations and the three-year average of the 98th percentile 24-hour averages).[14] If a more detailed assessment of $PM_{2.5}$ impacts is required, a Tier 2 analysis will be performed. USEPA's March 23, 2010 memo provides minimal guidance regarding this type of more detailed analysis, saying only "a Second Tier modeling analysis may be considered that would involve combining the monitored and modeled $PM_{2.5}$ concentrations on a seasonal or quarterly basis, and re-sorting the total impacts across the year to determine the cumulative design value."[15] Such an analysis would be discussed with the District and CEC staff prior to implementation.

[13] USEPA (2011a), p. 10.
[14] USEPA (2010a), p. 9.
[15] USEPA (2010a), p. 8.

3.6.4 State One-Hour NO_2 Standard

Compliance with the state one-hour NO_2 standard will be demonstrated using OLM and the paired-sum approach described above, except that the analysis will use highest, rather than 98th percentile concentrations, consistent with the form of the state standard.

3.7 Background Ambient Air Quality Data

Background ambient air quality data for the project area will be obtained from the monitoring sites most representative of the conditions that exist at the proposed project site. Modeled concentrations will be added to these representative background concentrations to demonstrate compliance with the CAAQS and NAAQS.

Table 2 shows the monitoring stations we propose to use as they provide the most representative ambient air quality background data. Where possible, recommended background concentration measurements should come from nearby monitoring stations with similar site characteristics. For this proposed project, the Oxnard (Rio Mesa School) monitoring station ($PM_{2.5}$, PM_{10}, O_3, and NO_2) is the closest monitoring station (approximately 7 miles from project site). The Santa Barbara monitoring station (SO_2) is located 29 miles northwest the project site; the University of California Santa Barbara (UCSB) monitoring station (CO) is located 39 miles northwest of the project site. In general, the Santa Barbara monitoring stations are considered to be representative of conditions at the project site due to their proximity to the coastline and to the project location.

Table 2
Representative Background Ambient Air Quality Monitoring Stations

Pollutant(s)	Monitoring Station	Distance to Project Site
$PM_{2.5}$, PM_{10}, O_3, and NO_2	Oxnard (Rio Mesa School)	7 miles
SO_2	Santa Barbara - UCSB	39 miles
CO	Santa Barbara	29 miles

For annual NO_2, 24-hour and annual SO_2, annual $PM_{2.5}$ (state standard) and all PM_{10} and CO averaging periods, the highest values monitored during the 2011–2013 period will be used to represent ambient background concentrations in the project area. The one-hour average NO_2 analyses will be performed as described above. For analyses of federal 24-hour and annual $PM_{2.5}$ impacts, the three-year average of the 98th percentile 24-hour monitored levels, and the maximum three-year annual average, for the period between 2009 and 2013, respectively, will be used to represent project area background because these values correspond to the method used for determining compliance with the federal $PM_{2.5}$ standards and are consistent with the guidance cited above.

3.7.1 Missing Data Protocol

Modeling project-generated one-hour NO_2 concentrations using the OLM method requires the use of ambient monitored O_3 concentrations. Because the OLM method uses the ambient ozone concentration for a particular hour to limit the conversion of NO to NO_2, it is important to have ozone concentrations for every hour. It is also important that any missing hourly ozone concentrations be filled in with a value that does not underestimate the ozone concentration for that hour, to avoid underestimating the resulting NO_2 concentration. In addition, computation of total hourly NO_2 concentrations requires use of the ambient monitored hourly NO_2 concentrations from the nearest monitoring station. As is the case for the hourly ozone data, it is important to have a background NO_2 value for every hour that does not underestimate actual background.

As discussed above, background ambient hourly O_3 and NO_2 concentrations for the project area will be provided by the SJVAPCD based on data collected at the monitoring station in Oxnard (Rio Mesa School). While these datasets are expected to exceed USEPA's 90% completeness criterion (that is, more than 90% of the data values are present for each month), there are still occasional missing values that must be filled in. It is our understanding that the SJVAPCD will perform the appropriate missing data substitutions based on guidance documents provided by the California Air Pollution Control Officers Association (CAPCOA, 2011).[16]

3.8 Health Risk Assessment

A health risk assessment will be performed according to the most current Office of Environmental Health Hazard Analysis (OEHHA) risk assessment guidance and software adopted and available at the time the risk assessment is prepared. OEHHA is currently in the process of revising its "Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments," and CARB is in the process of updating the Hotspots Analysis and Reporting Program (HARP) software to implement the updated OEHHA guidance; however, it is not clear when either revision will be released publicly. The HRA modeling will be executed using the most up-to-date version of CARB's HARP computer program with the latest available health database (the most recent version is dated July 3, 2014).[17] The HARP model will be used to assess cancer risk as well as non-cancer chronic and acute health hazards.

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[16] USEPA's March 2011 guidance document on 1-hour NO_2 modeling does not address missing hourly NO_2 data. However, the CAPCOA guidance document indicates that the recommended technique for filling single missing hours of NO_2 is consistent with the gap filling technique established by USEPA for filling a single hour of missing met data. All missing data procedures are subject to approval by the reviewing agencies.

[17] CARB anticipates having the Air Dispersion and Risk Assessment Modules available when the OEHHA "Hot Spots" Guidance Manual is adopted. The new version of HARP will include the updates to the OEHHA "Hot Spots" Risk Assessment Guidelines.

Although the new version of HARP will include AERMOD, the current version of the HARP model incorporates the ISCST3 model previously approved by USEPA. CARB offers a software program that allows AERMOD data to be imported into the HARP model, called HARP On-Ramp. Unless the updated HARP software is available prior to filing, the on-ramp will be used with the most recent versions of AERMOD and HARP for the screening risk assessment. The following HARP default options will be used for the health risk assessment:

- Home grown produce selected (0.15 for the fraction for leafy, exposed, protected, and root vegetables);
- Fish water pathway selected;
- Dermal absorption selected (0.02 m/s deposition rate);
- Soil ingestion selected (0.02 m/s deposition rate); and
- Mother's milk selected (0.02 m/s deposition rate).

In addition to the grid receptors identified above, discrete receptors will also be placed at the following locations:

- Any sensitive locations (e.g., child care facilities, schools, hospitals, prisons, libraries, etc.) at a distance of up to one mile from the project site; and
- Nearby residences and off-site workers.

3.9 Construction Air Quality Impact Assessment for the CEQA Analysis

The potential ambient impacts from air pollutant emissions during the construction activities associated with the proposed project will be evaluated by air quality modeling that will account for the project site location and the surrounding topography; the sources of emissions during construction, including vehicle and equipment exhaust emissions; and fugitive dust.

Types of Emission Sources – Construction of the proposed project will include phases such as site preparation; construction of foundations; and installation of the new gas turbine/associated equipment. The construction impacts analysis will include a schedule for the various construction phases.

Fugitive dust emissions from the construction of the Proposed Project result from the following activities:

- Excavation and grading at the project site;
- Onsite travel on paved and unpaved roads and across the unpaved construction areas;
- Aggregate and soil loading and unloading operations;
- Raw material transfer to and from material stockpiles; and
- Wind erosion of areas disturbed during construction activities.

Engine exhaust will be emitted from the following sources:

- Heavy equipment used for excavation, grading, and construction of new structures;
- Water trucks used to control construction dust emissions;
- Diesel- and gasoline-fueled welding machines, generators, air compressors, and water pumps;
- Gasoline-fueled pickup trucks and Diesel-fueled flatbed trucks used onsite to transport workers and materials around the construction site;
- Transport of mechanical and electrical equipment to the project site; and
- Transport of raw materials to and from stockpiles.

Emissions from a peak activity day will be modeled. Annual average emissions over the construction period will also be calculated and modeled for comparison with annual standards.

<u>Existing Ambient Levels</u> – The background data discussed earlier will be used to represent existing ambient levels for the construction analysis as well as the analysis of the impacts of project operations.

<u>Model Options</u> – The AERMOD "OLMGROUP ALL" option will be used to estimate ambient impacts from construction emissions. The modeling options and meteorological data described above will be used for the modeling analysis. An NO_2/NOx ratio of 11% will be used for modeling Diesel construction equipment, as specified in CAPCOA's 2011 guidance document (CAPCOA, 2011).

The construction site will be represented as both a set of volume sources and a separate set of area sources in the modeling analysis. Emissions will be divided into three categories: exhaust emissions, mechanically generated fugitive dust emissions, and wind-blown fugitive dust emissions. Exhaust emissions and mechanically generated fugitive dust emissions (e.g., dust from wheels of a scraper) will be modeled as volume sources with heights of 6 meters (for exhaust emissions) and 3 meters (for mechanically generated dust). Wind-blown fugitive dust emissions and sources at or near the ground that are at ambient temperature and have negligible vertical velocity will be modeled as area sources with a vertical dimension of 1 meter.

Combustion Diesel PM_{10} emission impacts from construction equipment will be evaluated to demonstrate that the cancer risk from construction activities will be below ten in one million at all receptors.

For the construction modeling analysis, the receptor grid will begin at the property boundary and will extend approximately one kilometer in all directions. The receptor grid will be laid out as follows:

1. One row of receptors spaced 25 meters apart along the facility's fence line;

2. Four tiers of receptors spaced 25 meters apart, extending 100 meters from the fence line; and

3. Additional tiers of receptors spaced 60 meters apart, extending from 100 meters to 1,000 meters from the fenceline.

It is unlikely that maximum construction impacts will occur more than one kilometer away from the project boundary. However, we will ensure that the maximum impacts are captured in our modeling analysis.

3.10 Cumulative Air Quality Impact Analysis

To address CEC requirements, a cumulative air quality modeling impacts analysis of the project's typical operating mode will be performed in combination with other stationary emissions sources within a six-mile radius that have received Authorities to Construct since June 1, 2013, or are in the permitting process. For each criteria pollutant, facilities having an emission increase of less than five tons per year are generally considered to be de minimis, and these facilities may be excluded from the cumulative impacts analysis. Information on any recently constructed/permitted sources that might be appropriate for a cumulative air quality impact analysis (as defined above) will be requested from the VCAPCD.

Upon receipt of sufficient information from the local air agencies to allow air dispersion modeling of the recently constructed/permitted non-project sources to be included in the cumulative air quality impact analysis, AERMOD will be used in a procedure similar to that described earlier in this protocol. As discussed above, the existing Unit 3 at the Mandalay Generating Station will also be modeled as part of the cumulative air quality impact analysis.

3.11 Nitrogen Deposition Analysis

As part of the Application for Certification filed with the CEC, it will be necessary to include a nitrogen deposition analysis. Nitrogen deposition is the input of NOx and ammonia (NH_3) derived pollutants, primarily nitric acid (HNO_3), from the atmosphere to the biosphere. Nitrogen deposition can lead to adverse impacts on sensitive species including direct toxicity, changes in species composition among native plants, and enhancement of invasive species.

We will perform a nitrogen deposition modeling analysis examining the impacts on nearby areas classified as critical habitat and/or areas containing sensitive biological resources. The analysis will compare the nitrogen deposition associated with the nitrogen emissions from the project with established nitrogen disposition significance thresholds. The AERMOD model will be used for this analysis. However, as discussed in the CEC staff's assessment of nitrogen deposition impacts for the Huntington Beach Energy Project, AERMOD tends to produce conservatively high predictions of nitrogen deposition rates (CEC, 2014). The assessment of significance for nitrogen deposition impacts will consider appropriate adjustments to background nitrate concentrations as well as emissions offsets provided for the project. If the maximum modeled nitrogen deposition impacts are determined to be significant, the Applicant will work with Staff to evaluate whether additional mitigation measures are needed.

4. REPORTING

The results of the criteria pollutant and TAC modeling will be integrated into the application documents, and will include the information listed below.

- Project Description – Site map and site plan along with descriptions of the emitting equipment and air pollution control systems.

- Model Options and Input – Model options, screening and refined source parameters, criteria pollutant and TAC emission rates, meteorological data, and receptor grids used for the modeling analyses.

- Air Dispersion Modeling – Dispersion modeling results will include the following:

  – Plot plan showing emission points, nearby buildings (including dimensions), cross-section lines, property lines, fence lines, roads, and UTM coordinates;

  – A table showing building heights used in the modeling analysis;

  – Summaries of maximum modeled impacts; and

  – Model input and output files, including BPIP-PRIME and meteorological files as well as hourly ozone and NO_2 files used in demonstrating compliance with the 1-hour NO_2 standard, in electronic format on a compact disc, together with a description (README file) of all filenames.

- HRA – The HRA will include the following:

  – Descriptions of the methodology and inputs to the construction and operation AERMOD runs;

  – Tables of TAC emission rates and health impacts;

  – Figures showing sensitive receptor locations; and

  – Model input and output files in electronic format on a compact disc, together with a description (README file) of all filenames.

5. REFERENCES

Atkinson, Dennis and Russell F. Lee (1992). "Procedures for Substituting Values for Missing NWS Meteorological Data for Use in Regulatory Air Quality Models." *http://www.epa.gov/scram001/surface/missdata.txt.*

Briggs, G.A. (1972). "Discussion on Chimney Plumes in Neutral and Stable Surroundings." Atmos. Environ. 6:507-510.

California Air Pollution Control Officers Association (CAPCOA) guidance document (2011). "Modeling Compliance of the Federal 1-Hour NO2 NAAQS." *http://www.valleyair.org/busind/pto/Tox_Resources/CAPCOANO2GuidanceDocument10-27-11.pdf*.

California Energy Commission (CEC) (2014). Final Staff Assessment for the Huntington Beach Energy Project, Appendix BIO-1, May 2014.

Cole, Henry S. and John E. Summerhays (1979). "A Review of Techniques Available for Estimating Short-Term NO_2 Concentrations," Journal of the Air Pollution Control Association, Volume 29, Number 8, pages 812-817, August 1979.

Nappo, C. J. et al. (1982). "The Workshop on the Representativeness of Meteorological Observations," June 1981, Boulder, Co. Bull. Amer. Meteor. Soc., Vol. 63, No. 7, pp. 761-764. American Meteorological Society, Boston, MA.

Office of Environmental Health Hazard Analysis (OEHHA) (2003). "Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments," August 2003.

San Joaquin Valley Air Pollution Control District (SJVAPCD) (2007). "Guidance for Air Dispersion Modeling." *http://www.valleyair.org/busind/pto/Tox_Resources/Modeling%20Guidance%20W_O%20Pic.pdf.*

U.S. Environmental Protection Agency (USEPA) (1985). "Guideline for Determination of Good Engineering Practice Stack Height," (Technical Support Document for the Stack Height Regulations) - Revised. EPA-450/4-80-023R.

USEPA (1987a). "Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)," Office of Air Quality Planning and Standards, Research Triangle Park, NC, EPA-450/4-87-007, May 1987.

USEPA (1987b). "On-Site Meteorological Program Guidance for Regulatory Modeling Applications."

USEPA (1987c). "Supplement A to the Guideline on Air Quality Models (Revised)."

USEPA (1990). "New Source Review Workshop Manual − Draft." Office of Air Quality Planning and Standards, Research Triangle Park, NC.

USEPA (1992a). "Procedures for Substituting Values for Missing NWS Meteorological Data for Use in Regulatory Air Quality Models." Office of Air Quality Planning and Standards, Research Triangle Park, NC. July 7, 1992.

USEPA (1992b). "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised," Report 454/R-92-019.

USEPA (1995). "Supplement C to the Guideline on Air Quality Models (revised)." Office of Air Quality Planning and Standards, Research Triangle Park, NC.

USEPA (1998). "Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long-Range Transport Impacts," Air Quality Modeling Group (MD-14), Research Triangle Park. National Park Service - Air Resource Division, Denver, Colorado. USDA Forest Service - Air Quality Program, Fort Collins, Colorado. U.S. Fish and Wildlife Service Air Quality Branch, Denver, Colorado.

USEPA (2000). "Meteorological Monitoring Guidance for Regulatory Modeling Applications," EPA-454/R-99-005. Office of Air Quality Planning & Standards, Research Triangle Park, NC. (PB 2001-103606) *www.epa.gov/scram001/*.

USEPA (2005). 40 CFR Part 51, Appendix W. "Guideline on Air Quality Models," Last update November 9, 2005.

USEPA (2008). "AERSURFACE Users Guide," EPA-454/B-08-001. Office of Air Quality Planning and Standards, Research Triangle Park, NC. January 2008. *http://www.epa.gov/scram001/7thconf/aermod/aersurface_userguide.pdf*.

USEPA (2009). Office of Air Quality Planning and Standards (OAQPS), AERMOD Implementation Workgroup, "AERMOD Implementation Guide," Last Revised: March 19, 2009.

USEPA (2010a). OAQPS, Memo from Stephen D. Page, Director, to USEPA Regional Modeling Contacts and others, "Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS," March 23, 2010.

USEPA (2010b). OAQPS, Memo from Tyler Fox, Leader, Air Quality Modeling Group, to USEPA Regional Air Division Directors, “Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard,” June 28, 2010.

USEPA (2010c). OAQPS, Memo from Stephen D. Page, Director, to USEPA Regional Air Division Directors, “Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program,” June 29, 2010.

USEPA (2010d), OAQPS, Memo from Stephen D. Page, Director, to USEPA Regional Air Division Directors, “Guidance Concerning the Implementation of the 1-hour SO_2 NAAQS for the Prevention of Significant Deterioration Program,” August 23, 2010.

USEPA (2010e). 75 FR 64864, “Prevention of Significant Deterioration (PSD) for Particulate Matter Less Than 2.5 Micrometers (PM2.5)—Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC),” October 20, 2010.

USEPA (2011a). OAQPS, Memo from Tyler Fox, Leader, Air Quality Modeling Group, to USEPA Regional Air Division Directors, “Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard,” March 1, 2011.

USEPA (2011b). Technology Transfer Network, Support Center for Regulatory Atmospheric Modeling, Air Quality Models, AERMOD Release 14134 and latest guidance (Draft user’s guide addenda dated May 16, 2014. http://www.epa.gov/ttn/scram/.

USEPA (2014a). EPA NO_2 / NOx In-Stack Ratio (ISR) Database, *http://www.epa.gov/ttn/scram/no2_isr_database.htm.*

USEPA (2014b). “New NO_2 Modeling Guidance,” August 12, 2014. Available at *http://www.epa.gov/ttn/scram/webinar/AERMOD_14134-NO2_Memo/20140812-Webinar_Slides.pdf.*

USEPA (2014c). “Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the N02 National Ambient Air Quality Standard,” September 30, 2014. Available at *http://www.epa.gov/ttn/scram/guidance/clarification/NO2_Clarification_Memo-20140930.pdf*

APPENDIX C-5

AMBIENT AIR QUALITY ANALYSIS MODELING INPUTS AND SCREENING ANALYSIS

Table C-5.1 Equipment Dimensions

Structure	Quantity	Size, L×W×H (feet)	Service/Remarks
New Structures			
Natural gas compressor enclosure[1]	1	35 × 12 × 10	Single compressor train
CTG	1	107 × 52 × 79 (top of air filter)	GE Frame 7HA.01 w/evap coolers
SCR	1	87 × 25 × 106	Nitrogen oxide removal equipment
SCR stack	1	22 feet diameter × 188 feet high	
Cooling fan module	1	65 × 38 × 18	Heat exchanger
Transmission structure	1	100-foot-high A-Frame	
Transmission structure	3	100-foot-high single-circuit monopole	
Existing MGS Structures to Be Reused			
Water treatment building	1	68 × 86 × 15	
Demineralized water storage tank	2	28 feet diameter × 32 feet	144,000 gallons
Service water storage tank	1	40 feet diameter × 48 feet	445,000-gallon capacity
Outfall structure	1		
Administration building	1	43 × 142 × 12	No modifications anticipated
Aqueous ammonia storage tanks	1	30 feet × 9 feet diameter	NO_X control (29 wt percent ammonia solution)
Warehouse building, portion to be reconfigured as control center	1		Remainder of building will continue to be used for storage

Table C-5.2
Puente Power Project
Screening Modeling Inputs

Case	Amb Temp deg F	Stack height feet	Stack Height meters	Stack Diam feet	Stack Diam meters	Stack flow wacfm	Stack flow m3/sec	Stack Vel ft/sec	Stack Vel m/sec	Stack Temp deg F	Stack Temp deg K
Winter/Maximum	38.9	188.0	57.30	22.0	6.71	3,551,197	1676.20	155.70	47.46	900.0	755.37
Winter/Minimum	38.9	188.0	57.30	22.0	6.71	2,026,942	956.74	88.87	27.09	900.0	755.37
ISO/Maximum	59.0	188.0	57.30	22.0	6.71	3,631,025	1713.88	159.20	48.52	900.0	755.37
ISO/Minimum	59.0	188.0	57.30	22.0	6.71	2,037,434	961.69	89.33	27.23	900.0	755.37
Summer Avg. Temp./Maximum w/cooling	77.8	188.0	57.30	22.0	6.71	3,601,374	1699.88	157.90	48.13	900.0	755.37
Summer Avg. Temp./Maximum w/o cooling	77.8	188.0	57.30	22.0	6.71	3,485,054	1644.98	152.80	46.57	900.0	755.37
Summer Avg. Temp./Minimum	77.8	188.0	57.30	22.0	6.71	2,087,611	985.37	91.53	27.90	900.0	755.37
Summer High Temp./Maximum w/cooling	82.0	188.0	57.30	22.0	6.71	3,626,463	1711.73	159.00	48.46	900.0	755.37
Summer High Temp./Maximum w/o cooling	82.0	188.0	57.30	22.0	6.71	3,450,842	1628.83	151.30	46.12	900.0	755.37
Summer High Temp./Minimum	82.0	188.0	57.30	22.0	6.71	2,111,787	996.78	92.59	28.22	900.0	755.37
Startup	38.9	188.0	57.30	22.0	6.71	2,026,942	956.74	88.87	27.09	900.0	755.37
Commissioning	38.9	188.0	57.30	22.0	6.71	2,026,942	956.74	88.87	27.09	900.0	755.37
	NOx lb/hr	**CO lb/hr**	**PM10 lb/hr**	**SOx lb/hr**		**NOx g/sec**	**CO g/sec**	**PM10 g/sec**	**SOx g/sec**		
Winter/Maximum	23.36	22.76	10.60	5.44		2.943	2.868	1.336	0.686		
Winter/Minimum	10.64	10.37	10.60	2.48		1.341	1.307	1.336	0.313		
ISO/Maximum	23.26	22.66	10.60	5.42		2.931	2.855	1.336	0.683		
ISO/Minimum	10.49	10.22	10.60	2.45		1.322	1.288	1.336	0.308		
Summer Avg. Temp./Maximum w/cooling	22.77	22.18	10.60	5.30		2.869	2.795	1.336	0.668		
Summer Avg. Temp./Maximum w/o cooling	21.66	21.10	10.60	5.05		2.729	2.659	1.336	0.636		
Summer Avg. Temp./Minimum	10.71	10.43	10.60	2.49		1.349	1.314	1.336	0.313		
Summer High Temp./Maximum w/cooling	22.97	22.37	10.60	5.35		2.894	2.819	1.336	0.674		
Summer High Temp./Maximum w/o cooling	21.28	20.73	10.60	4.95		2.681	2.612	1.336	0.624		
Summer High Temp./Minimum	10.82	10.54	10.60	2.51		1.363	1.328	1.336	0.317		
Startup/Shutdown/Restart	143.20	412.20	7.42	5.44		18.043	51.937	0.935	0.686		
Commissioning	246.35	1972.96	10.60	5.44		31.040	248.593	1.336	0.686		

Table C-5.3
Puente Power Project
Screening Level Modeling Impacts

Operating Mode	Conc. (ug/m3) NO2 1-hr	Conc. (ug/m3) SO2 1-hr	Conc. (ug/m3) CO 1-hr	Conc. (ug/m3) SO2 3-hr	Conc. (ug/m3) CO 8-hr	Conc. (ug/m3) SO2 24-hr	Conc. (ug/m3) PM10 24-hr	Conc. (ug/m3) NO2 Annual	Conc. (ug/m3) SO2 Annual	Conc. (ug/m3) PM10 Annual
Winter/Maximum	1.450	0.338	1.413	0.182	0.359	0.032	0.063	0.022	0.005	0.010
Winter/Minimum	0.840	0.196	0.819	0.113	0.261	0.029	0.126	0.020	0.005	0.020
ISO/Maximum	1.427	0.332	1.390	0.178	0.350	0.031	0.061	0.022	0.005	0.010
ISO/Minimum	0.827	0.193	0.805	0.111	0.256	0.029	0.125	0.020	0.005	0.020
Summer Avg. Temp./Maximum w/cooling	1.403	0.327	1.367	0.175	0.346	0.031	0.062	0.022	0.005	0.010
Summer Avg. Temp./Maximum w/o cooling	1.357	0.316	1.322	0.171	0.339	0.031	0.065	0.021	0.005	0.010
Summer Avg. Temp./Minimum	0.834	0.194	0.812	0.112	0.257	0.028	0.121	0.020	0.005	0.020
Summer High Temp./Maximum w/cooling	1.410	0.328	1.373	0.176	0.346	0.031	0.061	0.022	0.005	0.010
Summer High Temp./Maximum w/o cooling	1.339	0.312	1.305	0.170	0.337	0.031	0.065	0.021	0.005	0.011
Summer High Temp./Minimum	0.837	0.195	0.816	0.112	0.257	0.028	0.120	0.020	0.005	0.019
Startup/Shutdown/Restart	11.311	0.430	32.558	0.248	10.372	0.064	0.088	0.273	0.010	0.014
Commissioning	19.458	0.430	155.835	0.248	49.644	0.064	0.126	0.470	0.010	0.020

Table C-5.4
Puente Power Project
Emission Rates and Stack Parameters for Refined Modeling

	Stack Diam, m	Stack Height, m	Temp, deg K	Exhaust Flow, m3/s	Exhaust Velocity, m/s	Emission Rates, g/s NOx	SO2	CO	PM10	Stack Diam, ft	Stack Height, ft	Exh Temp, Deg F	Exh Flow Rate, ft3/m	Exhaust Velocity, ft/s	Emission Rates, lb/hr NOx	SO2	CO	PM10
Averaging Period: One hour NOx																		
New GT	6.7	57.3	755	1676.0	47.5	2.9434	n/a	n/a	n/a	22	188	900	3,551,197	156	23.36	n/a	n/a	n/a
New Generator Engine	0.2	21.3	957	1.5	82.4	0.1081	n/a	n/a	n/a	0.5	70	1263	3,185	270	0.86	n/a	n/a	n/a
Existing Unit 3 - Stack 1	3.9	16.5	651	604.3	50.0	34.7889	n/a	n/a	n/a	12.9	54	712	1,280,536	164	276.10	n/a	n/a	n/a
Existing Unit 3 - Stack 2	3.9	16.5	651	604.3	50.0	34.7889	n/a	n/a	n/a	12.9	54	712	1,280,536	164	276.10	n/a	n/a	n/a
Existing Unit 3 - Stack 3	3.9	16.5	651	604.3	50.0	34.7889	n/a	n/a	n/a	12.9	54	712	1,280,536	164	276.10	n/a	n/a	n/a
Existing Unit 3 - Stack 4	3.9	16.5	651	604.3	50.0	34.7889	n/a	n/a	n/a	12.9	54	712	1,280,536	164	276.10	n/a	n/a	n/a
Averaging Period: One hour CO and SOx																		
New GT	6.7	57.3	755	1676.0	47.5	n/a	0.6857	2.8678	n/a	22	188	900	3,551,197	156	n/a	5.44	22.76	n/a
New Generator Engine	0.2	21.3	957	1.5	82.4	n/a	0.0011	0.5648	n/a	0.5	70	1263	3,185	270	n/a	0.01	4.48	n/a
Existing Unit 3 - Stack 1	3.9	16.5	651	604.3	50.0	n/a	0.0450	8.6972	n/a	12.9	54	712	1,280,536	164	n/a	0.36	69.03	n/a
Existing Unit 3 - Stack 2	3.9	16.5	651	604.3	50.0	n/a	0.0450	8.6972	n/a	12.9	54	712	1,280,536	164	n/a	0.36	69.03	n/a
Existing Unit 3 - Stack 3	3.9	16.5	651	604.3	50.0	n/a	0.0450	8.6972	n/a	12.9	54	712	1,280,536	164	n/a	0.36	69.03	n/a
Existing Unit 3 - Stack 4	3.9	16.5	651	604.3	50.0	n/a	0.0450	8.6972	n/a	12.9	54	712	1,280,536	164	n/a	0.36	69.03	n/a
Averaging Period: Three hours SOx																		
New GT	6.7	57.3	755	1676.0	47.5	n/a	0.6857	n/a	n/a	22	188	900	3,551,197	156	n/a	5.44	n/a	n/a
New Generator Engine	0.2	21.3	957	1.5	82.4	n/a	0.0004	n/a	n/a	0.5	70	1,263	3,185	270	n/a	2.81E-03	n/a	n/a
Existing Unit 3 - Stack 1	3.9	16.5	651	604.3	50.0	n/a	0.0450	n/a	n/a	12.9	54	712	1,280,536	164	n/a	0.36	n/a	n/a
Existing Unit 3 - Stack 2	3.9	16.5	651	604.3	50.0	n/a	0.0450	n/a	n/a	12.9	54	712	1,280,536	164	n/a	0.36	n/a	n/a
Existing Unit 3 - Stack 3	3.9	16.5	651	604.3	50.0	n/a	0.0450	n/a	n/a	12.9	54	712	1,280,536	164	n/a	0.36	n/a	n/a
Existing Unit 3 - Stack 4	3.9	16.5	651	604.3	50.0	n/a	0.0450	n/a	n/a	12.9	54	712	1,280,536	164	n/a	0.36	n/a	n/a

Table C-5.4
Emission Rates and Stack Parameters for Refined Modeling (cont.)

	Stack Diam, m	Stack Height, m	Temp, deg K	Exhaust Flow, m3/s	Exhaust Velocity, m/s	NOx	SO2	CO	PM10	Stack Diam, ft	Stack Height, ft	Exh Temp, Deg F	Exh Flow Rate, ft3/m	Exhaust Velocity, ft/s	NOx	SO2	CO	PM10
						Emission Rates, g/s									Emission Rates, lb/hr			
Averaging Period: Eight hours CO																		
New GT	6.7	57.3	755	1676.0	47.5	n/a	n/a	2.8678	n/a	22	188	900	3,551,197	156	n/a	n/a	22.76	n/a
New Generator Engine	0.2	21.3	957	1.5	82.4	n/a	n/a	0.0706	n/a	0.5	70	1,263	3,185	270	n/a	n/a	0.56	n/a
Existing Unit 3 - Stack 1	3.9	16.5	651	604.3	50.0	n/a	n/a	8.6972	n/a	12.9	54	712	1,280,536	164	n/a	n/a	69.03	n/a
Existing Unit 3 - Stack 2	3.9	16.5	651	604.3	50.0	n/a	n/a	8.6972	n/a	12.9	54	712	1,280,536	164	n/a	n/a	69.03	n/a
Existing Unit 3 - Stack 3	3.9	16.5	651	604.3	50.0	n/a	n/a	8.6972	n/a	12.9	54	712	1,280,536	164	n/a	n/a	69.03	n/a
Existing Unit 3 - Stack 4	3.9	16.5	651	604.3	50.0	n/a	n/a	8.6972	n/a	12.9	54	712	1,280,536	164	n/a	n/a	69.03	n/a
Averaging Period: 24-hour SOx																		
New GT	6.7	57.3	755	1676.0	47.5	n/a	0.6857	n/a	n/a	22	188	900	3,551,197	156	n/a	5.44	n/a	n/a
New Generator Engine	0.2	21.3	957	1.5	82.4	n/a	0.0000	n/a	n/a	0.5	70	1,263	3,185	270	n/a	3.51E-04	n/a	n/a
Existing Unit 3 - Stack 1	3.9	16.5	651	604.3	50.0	n/a	0.0188	n/a	n/a	12.9	54	712	1,280,536	164	n/a	0.15	n/a	n/a
Existing Unit 3 - Stack 2	3.9	16.5	651	604.3	50.0	n/a	0.0188	n/a	n/a	12.9	54	712	1,280,536	164	n/a	0.15	n/a	n/a
Existing Unit 3 - Stack 3	3.9	16.5	651	604.3	50.0	n/a	0.0188	n/a	n/a	12.9	54	712	1,280,536	164	n/a	0.15	n/a	n/a
Existing Unit 3 - Stack 4	3.9	16.5	651	604.3	50.0	n/a	0.0188	n/a	n/a	12.9	54	712	1,280,536	164	n/a	0.15	n/a	n/a
Averaging Period: 24-hour PM10																		
New GT	6.7	57.3	755	956.6	27.1	n/a	n/a	n/a	1.3356	22	188	900	2,026,942	89	n/a	n/a	n/a	10.60
New Generator Engine	0.2	21.3	957	1.5	82.4	n/a	n/a	n/a	0.0002	0.5	70	1,263	3,185	270	n/a	n/a	n/a	1.60E-03
Existing Unit 3 - Stack 1	3.9	16.5	651	604.3	50.0	n/a	n/a	n/a	0.6370	12.9	54	712	1,280,536	164	n/a	n/a	n/a	5.06
Existing Unit 3 - Stack 2	3.9	16.5	651	604.3	50.0	n/a	n/a	n/a	0.6370	12.9	54	712	1,280,536	164	n/a	n/a	n/a	5.06
Existing Unit 3 - Stack 3	3.9	16.5	651	604.3	50.0	n/a	n/a	n/a	0.6370	12.9	54	712	1,280,536	164	n/a	n/a	n/a	5.06
Existing Unit 3 - Stack 4	3.9	16.5	651	604.3	50.0	n/a	n/a	n/a	0.6370	12.9	54	712	1,280,536	164	n/a	n/a	n/a	5.06

Table C-5.4
Emission Rates and Stack Parameters for Refined Modeling (cont.)

	Stack Diam, m		Temp, deg K	Exhaust Flow, m3/s	Exhaust Velocity, m/s	Emission Rates, g/s NOx	SO2	CO	PM10	Stack Diam, ft	Stack Height, ft	Exh Temp, Deg F	Exh Flow Rate, ft3/m	Exhaust Velocity, ft/s	Emission Rates, lb/hr NOx	SO2	CO	PM10
Averaging Period: Annual NOx and SOx																		
New GT	6.7	57.3	755	1676.0	47.5	1.0360	0.0637	n/a	n/a	22	188	900	3,551,197	156	8.22	0.51	n/a	n/a
New Generator Engine	0.2	21.3	957	1.5	82.4	0.0025	0.0000	n/a	n/a	0.5	70	1,263	3,185	270	0.02	1.92E-04	n/a	n/a
Existing Unit 3 - Stack 1	3.9	16.5	651	604.3	50.0	0.0148	0.0002	n/a	n/a	12.9	54	712	1,280,536	164	0.12	0.00	n/a	n/a
Existing Unit 3 - Stack 2	3.9	16.5	651	604.3	50.0	0.0148	0.0002	n/a	n/a	12.9	54	712	1,280,536	164	0.12	0.00	n/a	n/a
Existing Unit 3 - Stack 3	3.9	16.5	651	604.3	50.0	0.0148	0.0002	n/a	n/a	12.9	54	712	1,280,536	164	0.12	0.00	n/a	n/a
Existing Unit 3 - Stack 4	3.9	16.5	651	604.3	50.0	0.0148	0.0002	n/a	n/a	12.9	54	712	1,280,536	164	0.12	0.00	n/a	n/a
Averaging Period: Annual PM10																		
New GT	6.7	57.3	755	956.6	27.1	n/a	n/a	n/a	0.3676	22	188	900	2,026,942	89	n/a	n/a	n/a	2.92
New Generator Engine	0.2	21.3	957	1.5	82.4	n/a	n/a	n/a	0.0001	0.5	70	1,263	3,185	270	n/a	n/a	n/a	8.77E-04
Existing Unit 3 - Stack 1	3.9	16.5	651	604.3	50.0	n/a	n/a	n/a	0.0065	12.9	54	712	1,280,536	164	n/a	n/a	n/a	0.05
Existing Unit 3 - Stack 2	3.9	16.5	651	604.3	50.0	n/a	n/a	n/a	0.0065	12.9	54	712	1,280,536	164	n/a	n/a	n/a	0.05
Existing Unit 3 - Stack 3	3.9	16.5	651	604.3	50.0	n/a	n/a	n/a	0.0065	12.9	54	712	1,280,536	164	n/a	n/a	n/a	0.05
Existing Unit 3 - Stack 4	3.9	16.5	651	604.3	50.0	n/a	n/a	n/a	0.0065	12.9	54	712	1,280,536	164	n/a	n/a	n/a	0.05

Table C-5.5
Puente Power Project
Startup/Shutdown Modeling Inputs

Operating Case	Stack Ht. feet	Stack Dia. ft	Stack flow wacfm	Stack flow m3/sec	Stack Vel ft/sec	Stack Vel m/sec	Stack Temp deg F	Stack Temp deg K	NOx lb/hr	CO lb/hr	NOx g/sec	CO g/sec
New GT - Startup/Shutdown/Restart	188	22	2,026,942	956.74	88.87	27.09	900.00	755.37	143.20	412.20	18.04	51.94
Existing Unit 3 - Stack 1	54	12.9	1,280,536	604	164	50	712	651	276.10	69.03	34.79	8.70
Existing Unit 3 - Stack 2	54	12.9	1,280,536	604	164	50	712	651	276.10	69.03	34.79	8.70
Existing Unit 3 - Stack 3	54	12.9	1,280,536	604	164	50	712	651	276.10	69.03	34.79	8.70
Existing Unit 3 - Stack 4	54	12.9	1,280,536	604	164	50	712	651	276.10	69.03	34.79	8.70

Table C-5.6
Puente Power Project
Commissioning Modeling Inputs

Operating Case	Stack Ht. feet	Stack Dia. ft	Stack flow wacfm	Stack flow m3/sec	Stack Vel ft/sec	Stack Vel m/sec	Stack Temp deg F	Stack Temp deg K	NOx lb/hr	CO lb/hr	PM10 lb/hr	SOx lb/hr	NOx g/sec	CO g/sec	PM10 g/sec	SOx g/sec
New GT - Commissioning	188	22	2,026,942	957	89	27	900	755	246.35	1972.96	10.60	5.44	31.04	248.59	1.34	0.69
Existing Unit 1 - normal operation			673,202						6.35	75.81	4.74	1.14	0.80	9.55	0.60	0.14
Existing Unit 2 - normal operation			595,313						8.71	75.81	4.74	1.14	1.10	9.55	0.60	0.14
Existing Units 1 and 2 - combined stack =	200	17.25	1,268,515	599	90	28	181	356	15.06	151.62	9.48	2.27	1.90	19.10	1.19	0.29
Existing Unit 3 - Stack 1	54	12.9	1,280,536	604	164	50	712	651	276.10	69.03	5.06	0.36	34.79	8.70	0.64	0.05
Existing Unit 3 - Stack 2	54	12.9	1,280,536	604	164	50	712	651	276.10	69.03	5.06	0.36	34.79	8.70	0.64	0.05
Existing Unit 3 - Stack 3	54	12.9	1,280,536	604	164	50	712	651	276.10	69.03	5.06	0.36	34.79	8.70	0.64	0.05
Existing Unit 3 - Stack 4	54	12.9	1,280,536	604	164	50	712	651	276.10	69.03	5.06	0.36	34.79	8.70	0.64	0.05

Table /πpɸт

SCREEN3 – Fumigation Impacts

Screen 3 Simple Terrain Impacts (1-hr avg.) (µg/m3)

Case	Unit Impacts	Distance to Maximum (m)
Winter/Maximum	0.1702	1645
Winter/Minimum	0.2851	1410
ISO/Maximum	0.1704	1644
ISO/Minimum	0.2899	1403
Summer/Average w/cooling	0.1754	1631
Summer/Average w/o cooling	0.1809	1616
Summer/Average	0.2895	1403
Summer/High w/cooling	0.1751	1631
Summer/High w/o cooling	0.1834	1609
Summer/High	0.2878	1406
Startup	0.2851	1410
Commissioning	0.2851	1410
Unit 1 and2	0.9685	1075

Inversion Breakup Fumigation Impacts (1-hr avg.) (µg/m3)

Case	Unit Impacts	Distance to Maximum (m)
Winter/Maximum	0.23	55718
Winter/Minimum	0.338	41900
ISO/Maximum	0.224	56833
ISO/Minimum	0.3333	42341
Summer/Average w/cooling	0.2232	56975
Summer/Average w/o cooling	0.2284	56010
Summer/Average	0.325	43137
Summer/High w/cooling	0.2217	57261
Summer/High w/o cooling	0.2296	55801
Summer/High	0.3219	43443
Startup	0.338	41900
Commissioning	0.338	41900
Unit 1 and2	0.9261	19842

Unit Impacts – Inversion Breakup Fumigation (µg/m3)

Case	1-hr unit	3-hr unit	8-hr unit	24-hr unit
Winter/Maximum	0.2300	0.1801	0.1270	0.0696
Winter/Minimum	0.3380	0.2804	0.2065	0.1154
ISO/Maximum	0.2240	0.1775	0.1263	0.0695
ISO/Minimum	0.3333	0.2804	0.2086	0.1170
Summer/Average w/cooling	0.2232	0.1794	0.1291	0.0714
Summer/Average w/o cooling	0.2284	0.1842	0.1329	0.0735
Summer/Average	0.3250	0.2765	0.2073	0.1167
Summer/High w/cooling	0.2217	0.1786	0.1287	0.0712
Summer/High w/o cooling	0.2296	0.1859	0.1344	0.0745
Summer/High	0.3219	0.2744	0.2059	0.1160
Startup	0.3380	0.2804	0.2065	0.1154
Commissioning	0.3380	0.2804	0.2065	0.1154
Unit 1 and2	0.9685	0.8717	0.6780	0.3874

Notes:

1-hr: maximum of flat terrain or Inversion Breakup.

3-hr: 1.5 hrs of maximum (flat vs. Inversion Fum.) + 1.5 hrs of flat terrain, multiple by 0.9 conversion factor

8-hr: 1.5 hrs of maximum (flat vs. Inversion Fum.) + 6.5 hrs of flat terrain, multiple by 0.7 conversion factor

24-hr: 1.5 hrs of maximum (flat vs. Inversion Fum.) + 22.5 hrs of flat terrain, multiple by 0.4 conversion factor

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SCREEN3 – Fumigation Impacts

Emission Rates

Case	NOx g/sec	CO g/sec	PM10 g/sec	SOx g/sec
Winter/Maximum	2.943	2.868	1.336	0.686
Winter/Minimum	1.341	1.307	1.336	0.313
ISO/Maximum	2.931	2.855	1.336	0.683
ISO/Minimum	1.322	1.288	1.336	0.308
Summer/Average w/cooling	2.869	2.795	1.336	0.668
Summer/average w/o cooling	2.729	2.659	1.336	0.636
Summer/Average	1.349	1.314	1.336	0.313
Summer/High w/cooling	2.894	2.819	1.336	0.674
Summer/High w/o cooling	2.681	2.612	1.336	0.624
Summer/High	1.363	1.328	1.336	0.317
Startup	18.043	51.937	0.935	0.686
Commissioning	31.040	248.593	1.336	0.686
Unit 1 and 2	1.860	16.078	1.194	0.242

Inversion Breakup Fumigation Impacts (final) (µg/m3)

Case	Nox_1_HR	SO2_1_HR	CO_1_HR	SO2_3_HR	CO_8_HR	SO2_24 HR	PM_24_Hr
Winter/Maximum	0.68	0.16	0.66	0.1	0.4	0.0	0.09
Winter/Minimum	0.45	0.11	0.44	0.1	0.3	0.0	0.15
ISO/Maximum	0.66	0.15	0.64	0.1	0.4	0.0	0.09
ISO/Minimum	0.44	0.10	0.43	0.1	0.3	0.0	0.16
Summer/Average w/cooling	0.64	0.15	0.62	0.1	0.4	0.0	0.10
Summer/average w/o cooling	0.62	0.15	0.61	0.1	0.4	0.0	0.10
Summer/Average	0.44	0.10	0.43	0.1	0.3	0.0	0.16
Summer/High w/cooling	0.64	0.15	0.62	0.1	0.4	0.0	0.10
Summer/High w/o cooling	0.62	0.14	0.60	0.1	0.4	0.0	0.10
Summer/High	0.44	0.10	0.43	0.1	0.3	0.0	0.15
Startup	6.10	0.23	17.55	0.2	10.7	0.1	0.11
Maximum (Normal Operation/Startup)	6.10	0.23	17.55	0.19	10.73	0.05	0.16
Commissioning	10.49	0.23	84.02	0.2	51.3	0.1	0.15
Unit 1 and 2	1.80	0.23	15.57	0.2	10.9	0.1	0.46
Total Commissioning*	12.29	0.47	99.60	0.40	62.24	0.17	0.62

* Assuming New Turbine in commissioning and Unit 1 and 2 in operation

Table C-5.8

Screen3 – Shoreline Fumigation Impacts

Shoreline Fumigation Unit Impacts (1-hr avg.) (µg/m3)

Case	Unit Impacts	Distance to Maximum (m)
Winter/Maximum	1.353	6467
Winter/Minimum	2.066	4601
ISO/Maximum	1.314	6619
ISO/Minimum	2.034	4660
Summer/Average w/cooling	1.309	6639
Summer/Average w/o cooling	1.342	6507
Summer/Average	1.978	4767
Summer/High w/cooling	1.299	6678
Summer/High w/o cooling	1.35	6479
Summer/High	1.957	4808
Startup	2.066	4601
Commissioning	2.066	4601
Unit 1 and2	6.431	1760

Unit Impacts – Shoreline Fumigation (µg/m3)

Case	1-hr unit	3-hr unit	8-hr unit	24-hr unit
Winter/Maximum	1.3530	0.6854	0.2744	0.0977
Winter/Minimum	2.0660	1.0580	0.4333	0.1586
ISO/Maximum	1.3140	0.6680	0.2694	0.0968
ISO/Minimum	2.0340	1.0458	0.4318	0.1596
Summer/Average w/cooling	1.3090	0.6680	0.2716	0.0985
Summer/Average w/o cooling	1.3420	0.6853	0.2790	0.1014
Summer/Average	1.9780	1.0204	0.4243	0.1580
Summer/High w/cooling	1.2990	0.6633	0.2701	0.0981
Summer/High w/o cooling	1.3500	0.6900	0.2815	0.1025
Summer/High	1.9570	1.0102	0.4205	0.1569
Startup	2.0660	1.0580	0.4333	0.1586
Commissioning	2.0660	1.0580	0.4333	0.1586
Unit 1 and2	6.4310	3.3298	1.3949	0.5240

Note:
1-hr: maximum of flat terrain or Shoreline Fumigation.
3-hr: 1.5 hrs of maximum (flat vs. Shoreline Fum.) + 1.5 hrs of flat terrain, multiple by 0.9 conversion factor
8-hr: 1.5 hrs of maximum (flat vs. Shoreline Fum.) + 6.5 hrs of flat terrain, multiple by 0.7 conversion factor
24-hr: 1.5 hrs of maximum (flat vs. Shoreline Fum.) + 22.5 hrs of flat terrain, multiple by 0.4 conversion factor

Shoreline Fumigation Impacts (final) (µg/m3)

Case	Nox_1_HR	SO2_1_HR	CO_1_HR	SO2_3_HR	CO_8_HR	SO2_24 HR	PM_24_Hr
Winter/Maximum	3.98	0.93	3.88	0.47	0.79	0.07	0.13
Winter/Minimum	2.77	0.65	2.70	0.33	0.57	0.05	0.21
ISO/Maximum	3.85	0.90	3.75	0.46	0.77	0.07	0.13
ISO/Minimum	2.69	0.63	2.62	0.32	0.56	0.05	0.21
Summer/Average w/cooling	3.76	0.87	3.66	0.45	0.76	0.07	0.13
Summer/Average w/o cooling	3.66	0.85	3.57	0.44	0.74	0.06	0.14
Summer/Average	2.67	0.62	2.60	0.32	0.56	0.05	0.21
Summer/High w/cooling	3.76	0.87	3.66	0.45	0.76	0.07	0.13
Summer/High w/o cooling	3.62	0.84	3.53	0.43	0.74	0.06	0.14
Summer/High	2.67	0.62	2.60	0.32	0.56	0.05	0.21
Startup	37.28	1.42	107.30	0.73	22.51	0.11	0.15
Maximum (Normal Operation/Startup)	37.28	1.42	107.30	0.73	22.51	0.07	0.21
Commissioning	64.13	1.42	513.59	0.73	107.72	0.11	0.21
Unit 1 and 2	11.96	1.56	103.40	0.81	22.43	0.13	0.63
Total Commissioning*	76.09	2.98	616.99	1.53	130.15	0.24	0.84

* Assuming New Turbine in commissioning and Unit 1 and 2 in operation

APPENDIX C-6

CONSTRUCTION EMISSIONS

Appendix C-6
Construction/Decommissioning Emissions

C-6.1 Construction/Decommissioning Emissions

The construction/decommissioning of the proposed project is scheduled to occur in the following two phases:

- Construction of the new equipment (18-month period); and
- Decommissioning of the existing MGS Units 1 and 2 (3-month period)

There is no expected overlap between these two phases. The emissions were calculated for each phase, and the results of this analysis are discussed below.

C-6.1.1 Construction and Decommissioning Activities

The primary emission sources during construction will include exhaust from heavy construction equipment and vehicles, and fugitive dust generated by grading and excavating activities.

Combustion emissions during construction will result from the following:

- Exhaust from the diesel construction equipment used for site preparation, grading, excavation, trenching, and construction of onsite structures;
- Exhaust from water trucks used to control construction dust emissions;
- Exhaust from portable welding machines;
- Exhaust from pickup trucks and diesel trucks used to transport workers and materials around the construction site;
- Exhaust from diesel trucks used to deliver concrete, fuel, and construction supplies to the construction site including the heavy hauling of major components using trucks; and
- Exhaust from vehicles used by workers to commute to the construction site.

Fugitive dust emissions from the construction will result from the following:

- Dust entrained during site preparation and grading/excavation at the construction site;
- Dust entrained during onsite travel on paved and unpaved surfaces;
- Dust entrained during aggregate and soil loading and unloading operations; and
- Wind erosion of areas disturbed during construction activities.

A small staff of electricians, millwrights and laborers will perform the decommissioning activities. There will be no heavy construction equipment required during the decommissioning phase. As a result, the sources of combustion emissions during the 3-month decommissioning phase will be

- Exhaust from pickup trucks and diesel trucks used to transport workers and materials around the construction site; and
- Exhaust from vehicles used by workers to commute to the construction site.

C-6.1.2 Emissions Calculations

To determine the potential worst-case daily construction impacts, exhaust and dust emission rates have been evaluated for each source of emissions. Maximum short-term impacts are calculated based on the equipment mix expected during Month 4 of the construction schedule.[1] Annual emissions are based on the average equipment mix during the peak 12-month period out of the overall 18-month construction period. The detailed construction emissions calculations are shown in the tables attached to this analysis (all tables are located at the end of the document). As discussed in the modeling protocol submitted to the VCAPCD and CEC (see Appendix 4.1D), the CalEEMod model was used to calculate construction and decommissioning emissions for the proposed project. The following section provides additional details regarding the assumptions used in calculating construction/decommissioning emissions using the CalEEMod model.

Emissions of Fugitive Dust. CalEEMod generates estimates for fugitive dust emissions only during the "grading" phase of the construction period. To ensure that fugitive dust emissions from construction activities were not underestimated, the CalEEMod model phase type "Grading" was selected for the entire construction/decommissioning period. With this phase type selection, the CalEEMod model calculates dust emissions associated with various activities including grader, dozer operation, crawler tractor operation, and loader/loading activities.[2]

Windblown Dust. Emissions of windblown dust are not included in CalEEMod, so those emissions were calculated manually. The disturbed area for these calculations was determined by dividing the total active construction area (3.14 acres) by the months of construction. A PM_{10} emission factor of 0.011 ton/acre-month was used to estimate these emissions.[3] Windblown dust emission calculation is not applicable for the 3-month decommissioning phase.

Construction/Decommissioning Access. The primary construction access will be via a temporary construction access road off N. Harbor Blvd, at the northeast corner of the plant site. Part of the primary construction access roads will be paved, as well as portions of the project site to provide internal access to project facilities and site buildings. In addition, the construction worker parking and laydown areas will either be paved or have a gravel surface. For the construction air quality impact analysis performed for the AFC, the onsite worker travel were assumed to occur on paved surfaces (workers traveling to and from parking areas). The onsite delivery and haul truck travels were assumed to occur on a combination of paved and unpaved surfaces (delivery and haul trucks traveling to and from the storage and laydown areas).

Onsite Travel during Construction and Decommissioning. For delivery and haul vehicles, the onsite travel distance was taken as the distance from the plant entrance to the material storage and laydown area. For worker vehicles, the onsite travel distance

[1] See calculations in Section C-6.4.

[2] Section 4.3 of the CalEEMod User Guide, Appendix A.

[3] Source: Table ES-2, "Improvement of Specific Emission Factors (BACM Project No. 1), Final Report", prepared for South Coast AQMD by Midwest Research Institute, March 1996.

was taken as the distance from the plant entrance to the construction craft parking area. These distances were doubled to account for round-trip travel.

A manual calculation was performed to calculate the onsite paved surface vehicle travel emissions (combustion and paved fugitive dust emissions). This was done by first calculating the ratio of the onsite paved surface vehicle trip distances (a round trip distance on paved surface of approximately 0.06 miles was used for worker, a roundtrip distance of 0.46 miles on paved surface was used to estimate the onsite paved fugitive dust emissions for delivery and haul trucks) vs. the CalEEMod model offsite vehicle trip distances by vehicle type (offsite round trip distances were approximately 60 miles for workers, delivery trucks and haul trucks – based on travel distance to the county line). The offsite paved surface travel emissions per vehicle type (which includes a fugitive dust component) calculated by the CalEEMod model were multiplied by these ratios to calculate onsite vehicle combustion and paved surface travel emissions.

A portion of the onsite delivery and haul truck travel would be on unpaved surface (a round trip distance of 0.64 mile was estimated). To account for the onsite delivery and haul truck fugitive dust emissions on unpaved surface, a separate CalEEMod calculation was performed.

Paved/Unpaved Surface Travel Emissions Calculation Assumptions. The CalEEMod model default silt content and silt loading values were used for the unpaved/paved surface travel emission calculations. As described in the CalEEMod model user guide (see Section 4.4.3), EPA AP-42 methods are used to calculate fugitive dust emissions for paved and unpaved road travel. The CalEEMod model defaults for silt content/silt loading are based on statewide averages; these values are as follows: silt content = 8.5% and silt loading of 0.1 g/m^2.

Fugitive Dust Control Efficiency. The following fugitive dust control efficiencies were used as part of the CalEEMod model runs performed for construction/decommissioning activities. Mitigation measures used to minimize fugitive dust are discussed further below.

- As a CalEEMod model input, the onsite vehicle speed limit was set to 15 miles per hour. As described in Appendix A of the CalEEMod model user guide,[4] the resulting onsite unpaved road travel PM_{10} emission control efficiency associated with this speed limit is based on mitigation measures described by SCAQMD. The SCAQMD lists an unpaved road travel PM_{10} emission control efficiency of 57% for this mitigation measure.[5]
- For water application in active construction areas (watered at least 3 times a day), the PM_{10} emission control efficiency is 61% in the CalEEMod model for construction activities (e.g. grading, material handling, etc.).
- Paved roads within the construction site will be cleaned at least once per day on days when construction/decommissioning activities occur. The onsite paved road

[4] Section 11.1, CalEEMod User Guide, Appendix A, CalEEMod User Guide and all the related documents are available at: http://www.caleemod.com/

[5] SCAQMD Mitigation Measures and Control Efficiencies, Fugitive Dust, Table XI-A http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies/fugitive-dust

travel PM_{10} emission control efficiency was set to 9% as a CalEEMod model input based on control levels described by the SCAQMD.[6]

Exhaust Emission Source Assumptions. The number, type, and engine rating of the equipment used in the construction impact analysis were based on equipment loadings provided by the owner's engineer.

The CalEEMod model default engine load factors were used for the construction/decommissioning emission calculations (a function of the type of construction equipment in question). Due to the large number of different type/size equipment (which impacts the availability of Tier 4 engines), it was assumed that EPA Tier 4i engines would be used for the larger equipment (engines greater than 75 hp) and EPA Tier 4 engines would be used for smaller equipment (engines equal to or smaller than75 hp).

C-6.2 Available Mitigation Measures

Listed below are typical mitigation measures being proposed to control exhaust emissions from the diesel heavy equipment and potential emissions of fugitive dust during construction/decommissioning activities.

- Unpaved surface travel and disturbed areas in the project construction site will be watered as frequently as necessary to prevent fugitive dust plumes. The frequency of watering can be reduced or eliminated during periods of precipitation.
- The vehicle speed limit will be 15 miles per hour within the construction site.
- The construction site entrances shall be posted with visible speed limit signs.
- Construction equipment vehicle tires will be inspected and washed as necessary to be cleaned free of dirt prior to entering paved roadways.
- Gravel ramps of at least 20 feet in length will be provided at the tire washing/cleaning station.
- Unpaved exits from the construction site will be graveled or treated to prevent track-out to public roadways.
- Construction/decommissioning vehicles will enter the construction site through the treated entrance roadways, unless an alternative route has been submitted to and approved by the Compliance Project Manager.
- Construction areas adjacent to any paved roadway will be provided with sandbags or other measures as specified in the Storm Water Pollution Prevention Plan (SWPPP) to prevent run-off to roadways.
- Paved roads within the construction site will be cleaned at least once per day (or less during periods of precipitation) on days when construction activity occurs to prevent the accumulation of dirt and debris.

[6] SCAQMD Mitigation Measures and Control Efficiencies, Fugitive Dust, Table XI-C http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies/fugitive-dust

- At least the first 500 feet of any public roadway exiting from the construction site shall be cleaned at least once daily when dirt or runoff from the construction site is visible on public roadways.
- Soil storage piles and disturbed areas that remain inactive for longer than 10 days will be covered or treated with appropriate dust suppressant compounds.
- Vehicles used to transport solid bulk material on public roadways and having the potential to cause visible emissions will be provided with a cover, or the materials will be sufficiently wetted and loaded onto the trucks in a manner to provide at least one foot of freeboard.
- Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) will be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition shall remain in place until the soil is stabilized or permanently covered with vegetation.

An on-site Air Quality Construction Mitigation Manager will be responsible for directing and documenting compliance with construction and decommissioning related mitigation conditions.

C-6.2.1 Estimates of Emissions with Mitigation Measures: Onsite Construction and Decommissioning

Tables C-6-1 through C-6-4 show the estimated maximum daily and annual heavy equipment exhaust and fugitive dust emissions with the assumptions described above and the recommended mitigation measures for onsite construction/decommissioning activities. Detailedemission calculations are included in Section C-6.4.

C-6.3 Air Quality Impact Analysis

A dispersion modeling analysis was conducted based on the construction emissions discussed above using the approach discussed in the modeling protocol submitted to the VCAPCD and CEC (see Appendix 4.1D). As shown in the emission summary tables above, the emissions associated with the decommissioning of MGS Units 1 and 2 are lower (daily and annual) than the emissions associated with the construction of the new unit. Therefore, because the following construction modeling analysis examines worst-case impacts, a separate modeling analysis was not performed examining the impacts for the decommissioning activities.

As shown below in Table C-6-5, the results of the analysis indicate that construction activities are not expected to cause or contribute to exceedances of state or federal standards for criteria pollutants, with the exception of the daily and annual state PM_{10} standards. For this pollutant and averaging periods, existing background concentrations already exceed the state standards. The best available emission control techniques will be used to minimize emissions during construction. The project construction impacts are not unusual in comparison to most construction sites; construction sites that use good dust suppression techniques and low-emitting vehicles typically do not cause violations of air quality standards.

A screening health risk assessment (HRA) of construction impacts was performed in accordance with OEHHA guidance, which requires adjusting the 70-year lifetime dosage to an exposure period equal to that of the construction period. The screening HRA was prepared using the latest version of CARB's HARP2 model (CARB, 2014), the CARB July 2014 health database (CARB, 2014), and the OEHHA Hot Spots Program Guidance Manual (OEHHA, 2015). As part of this screening HRA, the USEPA-recommended air dispersion model, AERMOD, was used along with 5 years (2009–2013) of representative meteorological data from the Oxnard airport meteorological station. The new Risk Assessment Standalone Tool (RAST) that is part of the HARP2 model was also used with the air dispersion modeling output from the AERMOD model, to perform the risk assessment. The results of this analysis show a maximum off-property cancer risk of approximately 2.8 in one million. This impact is below the significance threshold of 10 in one million.

C-6.4 Detailed Construction and Decommissioning Emissions Calculations

Tables C-6-6 through C-6-23 provide detailed construction and decommissioning emission calculations.

TABLE C-6-1
Maximum Daily Emissions During Construction, Pounds per Day

	NOx	CO	ROC	SOx	PM_{10}	$PM_{2.5}$
Onsite						
Construction Equipment and Onsite Vehicle	73.67	141.71	3.76	0.24	0.38	0.38
Fugitive Dust (Construction Equipment and Onsite Vehicle)					6.28	1.95
Fugitive Dust (Wind Erosion)					0.14	0.05
Offsite						
Worker Travel	1.48	14.44	0.48	0.05	0.03	0.02
Delivery and Haul Trucks Travel	3.46	1.98	0.17	0.01	0.06	0.05
Fugitive Dust (Worker, Delivery and Haul Trucks)[a]					4.04	1.08
Total Emissions (Onsite and Offsite)	78.61	158.13	4.41	0.30	10.92	3.55

a. Offsite paved emissions.

TABLE C-6-2

Peak Annual Emissions During Construction, Tons per Year

	NOx	**CO**	**ROC**	**SOx**	**PM_{10}**	**$PM_{2.5}$**
Onsite						
Construction Equipment and Onsite Vehicle	8.85	17.13	0.45	0.03	0.05	0.05
Fugitive Dust (Construction Equipment and Onsite Vehicle)					0.51	0.09
Fugitive Dust (Wind Erosion)					0.02	0.01
Offsite						
Worker Travel	0.18	1.68	0.06	0.006	0.003	0.003
Delivery and Haul Trucks Travel	0.51	0.27	0.02	0.002	0.01	0.01
Fugitive Dust (Worker, Delivery and Haul Trucks)[a]					0.50	0.13
Total Emissions (Onsite and Offsite)	9.54	19.08	0.53	0.04	1.06	0.28

a. Offsite paved emissions.

TABLE C-6-3

Maximum Daily Emissions During Decommissioning, Pounds per Day

	NOx	CO	ROC	SOx	PM10	PM2.5
Onsite						
Construction Equipment and Onsite Vehicle	11.29	21.71	0.60	0.04	0.06	0.06
Fugitive Dust (Onsite Vehicle)					0.0004	0.0001
Offsite						
Worker Travel	0.15	1.50	0.05	0.01	0.003	0.003
Delivery and Haul Trucks Travel	0	0	0	0	0	0
Fugitive Dust (Worker, Delivery and Haul Trucks)[a]					0.42	0.11
Total Emissions (Onsite and Offsite)	11.44	23.21	0.65	0.04	0.49	0.18

a. Offsite paved emissions.

TABLE C-6-4

Total Emissions During Decommissioning (3-month Period), Tons

	NOx	CO	ROC	SOx	PM10	PM2.5
Onsite						
Construction Equipment and Onsite Vehicle	0.44	0.85	0.02	0.001	0.002	0.002
Fugitive Dust (Onsite Vehicle)					1.6E-05	4.3E-06
Offsite						
Worker Travel	0.01	0.05	0.002	2.1E-04	1.2E-04	1.2E-04
Delivery and Haul Trucks Travel	0	0	0	0	0	0
Fugitive Dust (Worker, Delivery and Haul Trucks)[a]					0.02	0.004
Total Emissions (Onsite and Offsite)	0.45	0.90	0.03	0.002	0.02	0.01

a. Offsite paved emissions.

Table C-6-5
Modeled Maximum Impacts During the Construction Period

Pollutant	Averaging Time	Maximum Project Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	State Standard ($\mu g/m^3$)	Federal Standard ($\mu g/m^3$)
NO_2	1-hour	170.5	169.5	340.0[d]	339	--
	98th percentile	145.7	67.8[a]	178.0	--	188
	Annual	9.9	13.2	23.1	57	100
SO_2	1-hour	3.3	7.9	11.2	655	--
	99th percentile	3.3	7.9[c]	11.2	--	196
	24-hour	0.4	5.2	5.6	105	--
CO	1-hour	1,981	2,875	4,856	23,000	40,000
	8-hour	452	2,185	2,637	10,000	10,000
PM_{10}	24-hour	15.8	56.9	72.7	50	150
	Annual	1.0	23.6	24.6	20	--
$PM_{2.5}$	24-hour	5.4	18.3[b]	23.7	--	35
	Annual	0.2	9.0	9.2	12	12

a. 1-hour NO_2 background concentration is shown as the 3-year average of the 98th percentile as that is the basis of the federal standard.
b. 24-hour $PM_{2.5}$ background concentration reflects 3-year average of the 98th percentile values based on form of standard.
c. 1-hour SO_2 background concentration reflects 3-year average of the 99th percentile values based on form of standard.
d. There is no expected exceedance of the standard because the maximum 1-hr avg. background level shown (during 2011) is nearly twice the maximum level during the past 10 years. Therefore, it is unlikely that the maximum modeled impact would occur at the same time this high background level would occur.

TABLE C-6-6
Construction of the Proposed P3 – Daily and Annual Construction Emissions

	NOx	CO	ROC	SOx	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions (lbs/day)						
Onsite						
Off-Road Equipment (combustion)	73.61	141.67	3.76	0.24	0.38	0.38
Off-Road Equipment and Onsite Vehicle (combustion)	73.67	141.71	3.76	0.24	0.38	0.38
Construction - Fugitive Dust					3.19	1.64
Onsite Vehicle - Fugitive Dust					3.08	0.31
Wind Erosion - Fugitive Dust					0.14	0.05
Subtotal (Onsite)	73.67	141.71	3.76	0.24	6.80	2.39
Offsite						
Worker Travel (combustion)	1.48	14.44	0.48	0.05	0.03	0.02
Delivery and Haul Truck Emissions (combustion)	3.46	1.98	0.17	0.01	0.06	0.05
Worker Travel - Fugitive Dust					3.78	1.01
Delivery and Haul Truck - Fugitive Dust					0.26	0.07
Subtotal (Offsite)	4.94	16.42	0.65	0.06	4.13	1.16
Total	78.61	158.13	4.41	0.30	10.92	3.55
Peak Annual Emissions (tons/yr, rolling 12-month maximum)						
	NOx	CO	ROC	SOx	PM_{10}	$PM_{2.5}$
Onsite						
Off-Road Equipment (combustion)	8.84	17.12	0.45	0.03	0.05	0.05
Off-Road Equipment and Onsite Vehicle (combustion)	8.85	17.13	0.45	0.03	0.05	0.05
Construction - Fugitive Dust					0.10	0.05
Onsite Vehicle - Fugitive Dust					0.41	0.04
Wind Erosion - Fugitive Dust					0.02	0.01
Subtotal (Onsite)	8.85	17.13	0.45	0.03	0.55	0.13
Offsite						
Worker Travel (combustion)	0.18	1.68	0.06	0.006	0.003	0.003
Delivery and Haul Truck Emissions (combustion)	0.51	0.27	0.02	0.002	0.01	0.01
Worker Travel - Fugitive Dust					0.46	0.12
Delivery and Haul Truck - Fugitive Dust					0.04	0.01
Subtotal (Offsite)	0.69	1.95	0.08	0.01	0.51	0.14
Total	9.54	19.08	0.53	0.04	1.06	0.28

TABLE C-6-7

Construction of the Proposed P3 – Modeled Emissions, Short-Term Impacts

Short Term Impacts (24 hours and less)					
Daily working hours (hr/day)	10				
	NOx	CO	SOx	PM_{10}	$PM_{2.5}$
TOTAL					
Off Road Equipment and Onsite Vehicle (Combustion) (lbs/day)	73.67	141.71	0.24	0.38	0.38
Off Road Equipment and Onsite Vehicle (Combustion) (lbs/hr)	7.37	14.17	0.02	0.04	0.04
Off Road Equipment and Onsite Vehicle (Combustion) (g/sec)	0.93	1.79	0.003	0.00	0.00
Construction and Onsite Vehicle (Fugitive Dust) (lbs/day)				6.28	1.95
Construction and Onsite Vehicle (Fugitive Dust) (lbs/hr)				0.63	0.19
Construction and Onsite Vehicle (Fugitive Dust) (g/sec)				0.08	0.02
Wind Erosion (Fugitive Dust) (lbs/day)				0.14	0.05
Wind Erosion (Fugitive Dust) (lbs/hr)				5.71E-03	2.28E-03
Wind Erosion (Fugitive Dust) (g/sec)				7.20E-04	2.88E-04

TABLE C-6-8

Construction of the Proposed P3 – Modeled Emissions, Long-Term Impacts

Long Term Impacts (Annual)					
Annual Number of Work Days, Rolling 12-month period (days/yr)	314				
Daily working hours (hr/day)	10				
	NOx	CO	SOx	PM_{10}	$PM_{2.5}$
TOTAL					
Off Road Equipment and Onsite Vehicle (Combustion) (tons/yr)	8.85	17.13	0.03	0.05	0.05
Off Road Equipment and Onsite Vehicle (Combustion) (lbs/hr)	5.64	10.91	0.02	0.03	0.03
Off Road Equipment and Onsite Vehicle (Combustion) (g/sec)	0.71	1.37	0.002	0.004	0.004
Construction and Onsite Vehicle (Fugitive Dust) (tons/yr)				0.51	0.09
Construction and Onsite Vehicle (Fugitive Dust) (lbs/hr)				0.32	0.05
Construction and Onsite Vehicle (Fugitive Dust) (g/sec)				0.041	0.007
Wind Erosion (Fugitive Dust) (tons/yr)				0.02	0.01
Wind Erosion (Fugitive Dust) (lbs/hr)				5.26E-03	2.10E-03
Wind Erosion (Fugitive Dust) (g/sec)				6.62E-04	2.65E-04

TABLE C-6-9
Construction of the Proposed P3 – Greenhouse Gas Emission Calculations

	GHG Emissions (MT, Total for 18-month Period)			
	CO2	CH4	N2O	CO2e
Onsite Off-Road Equipment	2,924	0.90	0.00	2,943
Onsite Off-Road Equipment and Onsite Vehicle	2,928	0.90	0.00	2,947
Offsite Worker Travel	444	0.02	0.00	444
Offsite Delivery and Haul Truck Emissions	178	0.001	0.00	178
Total	3,550	0.92	0.00	3,569

TABLE C-6-10

Construction of the Proposed P3 – Monthly and Annual Emission Calculations

Onsite Fugitive Dust																			
Project Month		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
		PM10																	
Onsite Fugitive (Off-Road)	(tons/month)	0.00	0.00	0.04	0.04	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
Onsite Fugitive (Onsite Vehicle)	(tons/month)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	(tons/month)	0.03	0.03	0.08	0.08	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.04	0.04	0.03	0.00	0.00	0.00
Offsite Fugitive - Delivery and Haul Trucks (Paved)	(tons/month)	3.05E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03	3.05E-03	0	0	0
Offsite Fugitive - Delivery and Haul Trucks (Unpaved)	(tons/month)	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	0.00	0.00	0.00
Offsite Fugitive - Worker Travel	(tons/month)	5.01E-03	1.13E-02	1.50E-02	2.40E-02	2.57E-02	3.38E-02	4.34E-02	5.01E-02	4.49E-02	4.57E-02	4.57E-02	4.38E-02	4.18E-02	3.38E-02	2.95E-02	2.12E-02	9.80E-03	5.90E-03
Onsite Fugitive (Off-Road)	Rolling 12-month total (tons/year)												0.09	0.10	0.10	0.06	0.02	0.02	0.02
Onsite Fugitive (Onsite Vehicle)	Rolling 12-month total (tons/year)												0.41	0.41	0.41	0.41	0.37	0.34	0.30
Offsite Fugitive - Delivery and Haul Trucks (Paved)	Rolling 12-month total (tons/year)												0.04	0.04	0.04	0.04	0.03	0.03	0.03
Offsite Fugitive - Worker Travel	Rolling 12-month total (tons/year)												0.39	0.43	0.45	0.46	0.46	0.44	0.42
		PM2.5																	
Onsite Fugitive (Off-Road)	(tons/month)	0.00E+00	0.00E+00	2.13E-02	2.22E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-04	3.80E-04	3.80E-04	0.00E+00	3.80E-04	3.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Onsite Fugitive (Onsite Vehicle)	(tons/month)	3.38E-03	3.38E-03	3.38E-03	3.38E-03	3.38E-03	3.38E-03	3.39E-03	3.39E-03	3.39E-03	3.39E-03	3.39E-03	3.39E-03	3.39E-03	3.38E-03	3.38E-03	5.65E-06	2.62E-06	1.58E-06
Onsite Off-Road + Onsite Vehicle	(tons/month)	3.38E-03	3.38E-03	2.47E-02	2.56E-02	3.38E-03	3.38E-03	3.39E-03	3.39E-03	3.74E-03	3.77E-03	3.77E-03	3.39E-03	3.77E-03	3.74E-03	3.38E-03	5.65E-06	2.62E-06	1.58E-06
Offsite Fugitive - Delivery and Haul Trucks (Paved)	(tons/month)	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	8.40E-04	0.00E+00	0.00E+00	0.00E+00
Offsite Fugitive - Delivery and Haul Trucks (Unpaved)	(tons/month)	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.00	0.00	0.00
Offsite Fugitive - Worker Travel	(tons/month)	1.34E-03	3.01E-03	4.01E-03	6.40E-03	6.88E-03	9.03E-03	1.16E-02	1.34E-02	1.20E-02	1.22E-02	1.22E-02	1.17E-02	1.12E-02	9.03E-03	7.88E-03	5.65E-03	2.62E-03	1.58E-03
Onsite Fugitive (Off-Road)	Rolling 12-month total (tons/year)												0.04	0.04	0.05	0.02	0.00	0.00	0.00
Onsite Fugitive (Onsite Vehicle)	Rolling 12-month total (tons/year)												0.04	0.04	0.04	0.04	0.04	0.03	0.03
Offsite Fugitive - Delivery and Haul Trucks (Paved)	Rolling 12-month total (tons/year)												0.01	0.01	0.01	0.01	0.01	0.01	0.01
Offsite Fugitive - Worker Travel	Rolling 12-month total (tons/year)												0.10	0.11	0.12	0.12	0.12	0.12	0.11

TABLE C-6-10 (CONT.)

Construction of the Proposed P3 – Monthly and Annual Emission Calculations

CalEEMod Results (Combustion Emissions)																			
Project Month		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
											ROG								
Onsite Off-Road Equipment	(tons/month)	2.44E-02	3.49E-02	4.35E-02	5.07E-02	4.11E-02	4.42E-02	3.88E-02	3.98E-02	3.75E-02	4.20E-02	2.87E-02	2.04E-02	2.37E-02	1.96E-02	6.76E-03	6.62E-03	3.82E-03	2.64E-03
Onsite Vehicle	(tons/month)	3.81E-05	3.90E-05	3.95E-05	3.95E-05	3.97E-05	4.07E-05	4.19E-05	4.27E-05	4.21E-05	4.22E-05	4.22E-05	4.20E-05	4.17E-05	4.07E-05	4.02E-05	2.45E-06	1.14E-06	6.80E-07
Onsite Off-Road + Onsite Vehicle	(tons/month)	2.44E-02	3.49E-02	4.35E-02	5.07E-02	4.11E-02	4.42E-02	3.88E-02	3.98E-02	3.75E-02	4.20E-02	2.87E-02	2.04E-02	2.37E-02	1.96E-02	6.80E-03	6.62E-03	3.82E-03	2.64E-03
Offsite Delivery and Haul Trucks	(tons/month)	2.04E-03	2.04E-03	2.04E-03	1.99E-03	1.99E-03	1.99E-03	1.99E-03	1.99E-03	1.99E-03	1.99E-03	1.99E-03	1.99E-03	1.99E-03	1.99E-03	1.99E-03	0	0	0
Offsite Worker Travel	(tons/month)	6.90E-04	1.56E-03	2.08E-03	2.99E-03	3.22E-03	4.22E-03	5.43E-03	6.26E-03	5.61E-03	5.71E-03	5.71E-03	5.48E-03	5.22E-03	4.22E-03	3.69E-03	2.45E-03	1.14E-03	6.80E-04
Onsite Off-Road Equipment	Rolling 12-month total (tons/year)												0.45	0.45	0.43	0.39	0.35	0.31	0.27
Onsite Off-Road + Onsite Vehicle	Rolling 12-month total (tons/year)												0.45	0.45	0.43	0.39	0.35	0.31	0.27
Offsite Delivery and Haul Trucks	Rolling 12-month total (tons/year)												0.02	0.02	0.02	0.02	0.02	0.02	0.02
Offsite Worker Travel	Rolling 12-month total (tons/year)												0.05	0.05	0.06	0.06	0.06	0.06	0.05
											NOx								
Onsite Off-Road Equipment	(tons/month)	0.50	0.69	0.86	0.99	0.82	0.88	0.78	0.83	0.75	0.81	0.54	0.40	0.45	0.39	0.16	0.16	0.12	0.08
Onsite Vehicle	(tons/month)	8.33E-04	8.35E-04	8.37E-04	7.68E-04	7.69E-04	7.72E-04	7.76E-04	7.78E-04	7.76E-04	7.77E-04	7.77E-04	7.76E-04	7.75E-04	7.72E-04	7.70E-04	7.60E-06	3.52E-06	2.12E-06
Onsite Off-Road + Onsite Vehicle	(tons/month)	5.00E-01	6.91E-01	8.65E-01	9.94E-01	8.23E-01	8.83E-01	7.77E-01	8.26E-01	7.47E-01	8.08E-01	5.40E-01	3.99E-01	4.55E-01	3.92E-01	1.65E-01	1.62E-01	1.17E-01	7.83E-02
Offsite Delivery and Haul Trucks	(tons/month)	0.0453	0.0453	0.0453	0.0414	0.0414	0.0414	0.0414	0.0414	0.0414	0.0414	0.0414	0.0414	0.0414	0.0414	0.0414	0	0	0
Offsite Worker Travel	(tons/month)	0.002	0.005	0.006	0.009	0.010	0.013	0.017	0.019	0.017	0.018	0.018	0.017	0.016	0.013	0.011	0.008	0.004	0.002
Onsite Off-Road Equipment	Rolling 12-month total (tons/year)												8.84	8.80	8.50	7.80	6.97	6.26	5.46
Onsite Off-Road + Onsite Vehicle	Rolling 12-month total (tons/year)												8.85	8.81	8.51	7.81	6.98	6.27	5.47
Offsite Delivery and Haul Trucks	Rolling 12-month total (tons/year)												0.51	0.50	0.50	0.50	0.46	0.41	0.37
Offsite Worker Travel	Rolling 12-month total (tons/year)												0.15	0.17	0.17	0.18	0.18	0.17	0.16
											CO								
Onsite Off-Road Equipment	(tons/month)	0.964	1.321	1.653	1.913	1.573	1.691	1.476	1.534	1.434	1.599	1.125	0.841	0.962	0.798	0.330	0.329	0.219	0.155
Onsite Vehicle	(tons/month)	4.36E-04	4.61E-04	4.75E-04	4.94E-04	5.01E-04	5.30E-04	5.65E-04	5.89E-04	5.70E-04	5.73E-04	5.73E-04	5.66E-04	5.59E-04	5.30E-04	5.14E-04	7.18E-05	3.32E-05	2.00E-05
Onsite Off-Road + Onsite Vehicle	(tons/month)	9.64E-01	1.32E+00	1.65E+00	1.91E+00	1.57E+00	1.69E+00	1.48E+00	1.53E+00	1.43E+00	1.60E+00	1.13E+00	8.42E-01	9.63E-01	7.99E-01	3.31E-01	3.29E-01	2.19E-01	1.55E-01
Offsite Delivery and Haul Trucks	(tons/month)	0.023	0.023	0.023	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.000	0.000	0.000
Offsite Worker Travel	(tons/month)	0.020	0.044	0.059	0.087	0.094	0.123	0.158	0.182	0.163	0.166	0.166	0.159	0.152	0.123	0.107	0.072	0.033	0.020
Onsite Off-Road Equipment	Rolling 12-month total (tons/year)												17.12	17.12	16.60	15.28	13.69	12.34	10.80
Onsite Off-Road + Onsite Vehicle	Rolling 12-month total (tons/year)												17.13	17.13	16.60	15.28	13.70	12.34	10.81
Offsite Delivery and Haul Trucks	Rolling 12-month total (tons/year)												0.27	0.27	0.27	0.27	0.24	0.22	0.20
Offsite Worker Travel	Rolling 12-month total (tons/year)												1.42	1.55	1.63	1.68	1.67	1.61	1.50
											SO2								
Onsite Off-Road Equipment	(tons/month)	1.59E-03	2.23E-03	2.80E-03	3.22E-03	2.62E-03	2.82E-03	2.48E-03	2.56E-03	2.40E-03	2.67E-03	1.86E-03	1.34E-03	1.56E-03	1.28E-03	4.80E-04	4.70E-04	2.90E-04	2.00E-04
Onsite Vehicle	(tons/month)	2.63E-06	2.71E-06	2.76E-06	2.87E-06	2.89E-06	2.99E-06	3.11E-06	3.19E-06	3.12E-06	3.13E-06	3.13E-06	3.11E-06	3.09E-06	2.99E-06	2.93E-06	2.60E-07	1.20E-07	7.00E-08
Onsite Off-Road + Onsite Vehicle	(tons/month)	1.59E-03	2.23E-03	2.80E-03	3.22E-03	2.62E-03	2.82E-03	2.48E-03	2.56E-03	2.40E-03	2.67E-03	1.86E-03	1.34E-03	1.56E-03	1.28E-03	4.83E-04	4.70E-04	2.90E-04	2.00E-04
Offsite Delivery and Haul Trucks	(tons/month)	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	1.40E-04	0.00E+00	0.00E+00	0.00E+00
Offsite Worker Travel	(tons/month)	6.00E-05	1.40E-04	1.90E-04	3.00E-04	3.20E-04	4.20E-04	5.40E-04	6.20E-04	5.50E-04	5.60E-04	5.60E-04	5.40E-04	5.20E-04	4.20E-04	3.60E-04	2.60E-04	1.20E-04	7.00E-05
Onsite Off-Road Equipment	Rolling 12-month total (tons/year)												0.03	0.03	0.03	0.03	0.02	0.02	0.02
Onsite Off-Road + Onsite Vehicle	Rolling 12-month total (tons/year)												0.03	0.03	0.03	0.03	0.02	0.02	0.02
Offsite Delivery and Haul Trucks	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite Worker Travel	Rolling 12-month total (tons/year)												0.00	0.01	0.01	0.01	0.01	0.01	0.01
											PM10								
Onsite Off-Road Equipment	(tons/month)	2.56E-03	3.58E-03	4.50E-03	5.17E-03	4.19E-03	4.51E-03	3.96E-03	4.07E-03	3.82E-03	4.27E-03	2.96E-03	2.14E-03	2.49E-03	2.05E-03	7.70E-04	7.70E-04	4.70E-04	3.30E-04
Onsite Vehicle	(tons/month)	1.31E-05	1.31E-05	1.31E-05	1.30E-05	1.30E-05	1.31E-05	1.31E-05	1.32E-05	1.32E-05	1.32E-05	1.32E-05	1.31E-05	1.31E-05	1.31E-05	1.30E-05	1.50E-07	7.00E-08	4.00E-08
Onsite Off-Road + Onsite Vehicle	(tons/month)	2.57E-03	3.59E-03	4.51E-03	5.18E-03	4.20E-03	4.52E-03	3.97E-03	4.08E-03	3.83E-03	4.28E-03	2.97E-03	2.15E-03	2.50E-03	2.06E-03	7.83E-04	7.70E-04	4.70E-04	3.30E-04
Offsite Delivery and Haul Trucks	(tons/month)	7.10E-04	7.10E-04	7.10E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	7.00E-04	0.00E+00	0.00E+00	0.00E+00
Offsite Worker Travel	(tons/month)	4.00E-05	8.00E-05	1.10E-04	1.70E-04	1.80E-04	2.40E-04	3.10E-04	3.60E-04	3.20E-04	3.30E-04	3.30E-04	3.10E-04	3.00E-04	2.40E-04	2.10E-04	1.50E-04	7.00E-05	4.00E-05
Onsite Off-Road Equipment	Rolling 12-month total (tons/year)												0.05	0.05	0.04	0.04	0.04	0.03	0.03
Onsite Off-Road + Onsite Vehicle	Rolling 12-month total (tons/year)												0.05	0.05	0.04	0.04	0.04	0.03	0.03
Offsite Delivery and Haul Trucks	Rolling 12-month total (tons/year)												0.01	0.01	0.01	0.01	0.01	0.01	0.01
Offsite Worker Travel	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-6-10 (CONT.)

Construction of the Proposed P3 – Monthly and Annual Emission Calculations

Project Month		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		PM2.5																	
Onsite Off-Road Equipment	(tons/month)	2.56E-03	3.58E-03	4.50E-03	5.17E-03	4.19E-03	4.51E-03	3.96E-03	4.07E-03	3.82E-03	4.27E-03	2.96E-03	2.14E-03	2.49E-03	2.05E-03	7.70E-04	7.70E-04	4.70E-04	3.30E-04
Onsite Vehicle	(tons/month)	1.21E-05	1.22E-05	1.22E-05	1.19E-05	1.19E-05	1.20E-05	1.20E-05	1.21E-05	1.20E-05	1.20E-05	1.20E-05	1.20E-05	1.20E-05	1.20E-05	1.19E-05	1.40E-07	6.00E-08	4.00E-08
Onsite Off-Road + Onsite Vehicle	(tons/month)	2.57E-03	3.59E-03	4.51E-03	5.18E-03	4.20E-03	4.52E-03	3.97E-03	4.08E-03	3.83E-03	4.28E-03	2.97E-03	2.15E-03	2.50E-03	2.06E-03	7.82E-04	7.70E-04	4.70E-04	3.30E-04
Offsite Delivery and Haul Trucks	(tons/month)	6.60E-04	6.60E-04	6.60E-04	6.40E-04	6.40E-04	6.40E-04	6.40E-04	6.40E-04	6.40E-04	6.40E-04	6.40E-04	6.40E-04	6.40E-04	6.40E-04	6.40E-04	0.00E+00	0.00E+00	0.00E+00
Offsite Worker Travel	(tons/month)	3.00E-05	7.00E-05	1.00E-04	1.60E-04	1.70E-04	2.20E-04	2.90E-04	3.30E-04	3.00E-04	3.00E-04	3.00E-04	2.90E-04	2.80E-04	2.20E-04	1.90E-04	1.40E-04	6.00E-05	4.00E-05
Onsite Off-Road Equipment	Rolling 12-month total (tons/year)												0.05	0.05	0.04	0.04	0.04	0.03	0.03
Onsite Off-Road + Onsite Vehicle	Rolling 12-month total (tons/year)												0.05	0.05	0.04	0.04	0.04	0.03	0.03
Offsite Delivery and Haul Trucks	Rolling 12-month total (tons/year)												0.01	0.01	0.01	0.01	0.01	0.01	0.01
Offsite Worker Travel	Rolling 12-month total (tons/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00
		CO2																	
Onsite Off-Road Equipment	(MT/month)	143.6498	201.2614	252.7633	286.2528	232.5823	250.4906	219.7616	226.1233	212.3542	236.8151	164.4024	118.818	137.9305	113.903	42.3733	41.3639	25.2776	17.8806
Onsite Vehicle	(MT/month)	0.23	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.25	0.26	0.26	0.25	0.25	0.25	0.24	0.02	0.01	0.00
Onsite Off-Road + Onsite Vehicle	(MT/month)	143.87	201.49	253.00	286.49	232.82	250.74	220.02	226.38	212.61	237.07	164.66	119.07	138.18	114.15	42.62	41.38	25.29	17.89
Offsite Delivery and Haul Trucks	(MT/month)	12.04	12.04	12.04	11.85	11.85	11.85	11.85	11.85	11.85	11.85	11.85	11.85	11.85	11.85	11.85	0.00	0.00	0.00
Offsite Worker Travel	(MT/month)	4.34	9.75	13.00	20.06	21.56	28.30	36.39	41.99	37.58	38.26	38.26	36.72	34.99	28.30	24.71	17.02	7.88	4.74
Onsite Off-Road Equipment	Rolling 12-month total (MT/year)												2,545	2,540	2,452	2,242	1,997	1,790	1,557
Onsite Off-Road + Onsite Vehicle	Rolling 12-month total (MT/year)												2,548	2,543	2,455	2,245	2,000	1,792	1,559
Offsite Delivery and Haul Trucks	Rolling 12-month total (MT/year)												143	143	142	142	130	119	107
Offsite Worker Travel	Rolling 12-month total (MT/year)												326	357	375	387	384	370	347
		CH4																	
Onsite Off-Road Equipment	(MT/month)	0.044	0.062	0.078	0.089	0.072	0.077	0.068	0.069	0.065	0.073	0.050	0.036	0.042	0.035	0.013	0.013	0.008	0.006
Onsite Vehicle	(MT/month)	1.48E-06	1.72E-06	1.87E-06	2.17E-06	2.23E-06	2.53E-06	2.89E-06	3.14E-06	2.94E-06	2.97E-06	2.97E-06	2.90E-06	2.83E-06	2.53E-06	2.37E-06	7.40E-07	3.40E-07	2.10E-07
Onsite Off-Road + Onsite Vehicle	(MT/month)	0.04	0.06	0.08	0.09	0.07	0.08	0.07	0.07	0.07	0.07	0.05	0.04	0.04	0.04	0.01	0.01	0.01	0.01
Offsite Delivery and Haul Trucks	(MT/month)	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	7.00E-05	0.00E+00	0.00E+00	0.00E+00
Offsite Worker Travel	(MT/month)	2.00E-04	4.40E-04	5.90E-04	8.90E-04	9.50E-04	1.25E-03	1.61E-03	1.86E-03	1.66E-03	1.69E-03	1.69E-03	1.62E-03	1.55E-03	1.25E-03	1.09E-03	7.40E-04	3.40E-04	2.10E-04
Onsite Off-Road Equipment	Rolling 12-month total (MT/year)												0.78	0.78	0.75	0.69	0.61	0.55	0.48
Onsite Off-Road + Onsite Vehicle	Rolling 12-month total (MT/year)												1	1	1	1	1	1	0
Offsite Delivery and Haul Trucks	Rolling 12-month total (MT/year)												8.40E-04	8.40E-04	8.40E-04	8.40E-04	7.70E-04	7.00E-04	6.30E-04
Offsite Worker Travel	Rolling 12-month total (MT/year)												1.45E-02	1.58E-02	1.66E-02	1.71E-02	1.70E-02	1.64E-02	1.53E-02
		N2O																	
Onsite Off-Road Equipment	(MT/month)	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	0.00	0.00
Onsite Vehicle	(MT/month)	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	0.00	0.00
Onsite Off-Road + Onsite Vehicle	(MT/month)	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	0.00	0.00
Offsite Delivery and Haul Trucks	(MT/month)	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	0.00	0.00
Offsite Worker Travel	(MT/month)	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	0.00	0.00
Onsite Off-Road Equipment	Rolling 12-month total (MT/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	Rolling 12-month total (MT/year)												0	0	0	0	0	0	0
Offsite Delivery and Haul Trucks	Rolling 12-month total (MT/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite Worker Travel	Rolling 12-month total (MT/year)												0.00	0.00	0.00	0.00	0.00	0.00	0.00
		CO2e																	
Onsite Off-Road Equipment	(MT/month)	144.57	202.55	254.39	288.11	234.09	252.11	221.18	227.58	213.72	238.34	165.46	119.58	138.82	114.64	42.65	41.64	25.45	18.00
Onsite Vehicle	(MT/month)	0.23	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.25	0.26	0.26	0.25	0.25	0.25	0.24	0.02	0.01	0.00
Onsite Off-Road + Onsite Vehicle	(MT/month)	144.80	202.78	254.63	288.35	234.33	252.36	221.44	227.84	213.98	238.60	165.72	119.84	139.07	114.89	42.89	41.66	25.46	18.01
Offsite Delivery and Haul Trucks	(MT/month)	12.04	12.04	12.04	11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86	11.86	0.00	0.00	0.00
Offsite Worker Travel	(MT/month)	4.35	9.76	13.02	20.08	21.58	28.33	36.42	42.03	37.62	38.29	38.29	36.75	35.02	28.33	24.73	17.03	7.89	4.75
Onsite Off-Road Equipment	Rolling 12-month total (MT/year)												2,562	2,556	2,468	2,256	2,010	1,801	1,567
Onsite Off-Road + Onsite Vehicle	Rolling 12-month total (MT/year)												2,565	2,559	2,471	2,259	2,013	1,804	1,569
Offsite Delivery and Haul Trucks	Rolling 12-month total (MT/year)												143	143	142	142	130	119	107
Offsite Worker Travel	Rolling 12-month total (MT/year)												327	357	376	387	384	371	347

TABLE C-6-11

Construction of the Proposed P3 – Summer (Peak) Daily Emissions

Onsite Fugitive Dust																		
Project Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
	PM10 (lbs/day)																	
Onsite Fugitive (Off-Road)	0.00	0.00	3.19	3.19	0.00	0.00	0.00	0.00	0.26	0.26	0.26	0.00	0.26	0.26	0.00	0.00	0.00	0.00
Onsite Fugitive (Onsite Vehicle)	2.74	2.84	2.84	2.74	3.08	2.84	2.85	2.74	2.96	2.74	2.74	2.96	2.74	2.84	2.84	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	2.74	2.84	6.04	5.93	3.08	2.84	2.85	2.74	3.22	3.00	3.00	2.96	3.00	3.10	2.84	0.00	0.00	0.00
Offsite Fugitive - Delivery and Haul Trucks (Paved)	0.23	0.24	0.24	0.23	0.26	0.24	0.24	0.23	0.25	0.23	0.23	0.25	0.23	0.24	0.24	0.00	0.00	0.00
Offsite Fugitive - Delivery and Haul Trucks (Unpaved)	256.38	266.24	266.24	256.38	288.43	266.24	266.24	256.38	276.89	256.38	256.38	276.89	256.38	266.24	266.24	0.00	0.00	0.00
Offsite Fugitive - Worker Travel	0.38	0.88	1.18	1.81	2.19	2.65	3.40	3.78	3.66	3.45	3.45	3.57	3.15	2.65	2.31	1.60	0.80	0.46
	PM2.5 (lbs/day)																	
Onsite Fugitive (Off-Road)	0.00	0.00	1.64	1.64	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.00	0.03	0.03	0.00	0.00	0.00	0.00
Onsite Fugitive (Onsite Vehicle)	0.27	0.28	0.28	0.27	0.31	0.28	0.28	0.27	0.30	0.27	0.27	0.30	0.27	0.28	0.28	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	0.27	0.28	1.93	1.92	0.31	0.28	0.28	0.27	0.32	0.30	0.30	0.30	0.30	0.31	0.28	0.00	0.00	0.00
Offsite Fugitive - Delivery and Haul Trucks (Paved)	0.06	0.07	0.07	0.06	0.07	0.07	0.07	0.06	0.07	0.06	0.06	0.07	0.06	0.07	0.07	0.00	0.00	0.00
Offsite Fugitive - Delivery and Haul Trucks (Unpaved)	25.56	26.54	26.54	25.56	28.76	26.54	26.54	25.56	27.61	25.56	25.56	27.61	25.56	26.54	26.54	0.00	0.00	0.00
Offsite Fugitive - Worker Travel	0.10	0.24	0.31	0.48	0.58	0.71	0.91	1.01	0.98	0.92	0.92	0.95	0.84	0.71	0.62	0.43	0.21	0.12

CalEEMod Results (Combustion Emissions)																		
Project Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
	ROG (lbs/day)																	
Onsite Off-Road Equipment	1.81	2.68	3.34	3.76	3.43	3.40	2.99	2.95	3.00	3.11	2.13	1.63	1.76	1.51	0.52	0.49	0.31	0.20
Onsite Vehicle	2.76E-03	2.94E-03	2.98E-03	2.87E-03	3.25E-03	3.08E-03	3.18E-03	3.13E-03	3.32E-03	3.08E-03	3.08E-03	3.31E-03	3.05E-03	3.08E-03	3.04E-03	1.88E-04	9.42E-05	5.45E-05
Onsite Off-Road + Onsite Vehicle	1.81	2.69	3.35	3.76	3.43	3.40	2.99	2.95	3.00	3.11	2.13	1.64	1.76	1.51	0.52	0.49	0.31	0.20
Offsite Delivery and Haul Trucks	0.15	0.15	0.15	0.14	0.16	0.15	0.15	0.14	0.16	0.14	0.14	0.16	0.14	0.15	0.15	0.00	0.00	0.00
Offsite Worker Travel	0.05	0.12	0.16	0.23	0.28	0.34	0.43	0.48	0.46	0.44	0.44	0.45	0.40	0.34	0.29	0.19	0.09	0.05
	NOx (lbs/day)																	
Onsite Off-Road Equipment	36.98	53.08	66.48	73.61	68.50	67.86	59.72	61.17	59.70	59.77	39.97	31.84	33.68	30.10	12.65	11.97	9.36	6.02
Onsite Vehicle	0.06	0.06	0.06	0.05	0.06	0.06	0.06	0.05	0.06	0.05	0.05	0.06	0.05	0.06	0.06	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	37.04	53.14	66.54	73.66	68.56	67.92	59.78	61.22	59.76	59.83	40.02	31.90	33.74	30.16	12.71	11.97	9.36	6.02
Offsite Delivery and Haul Trucks	3.21	3.33	3.33	2.93	3.30	3.04	3.04	2.93	3.17	2.93	2.93	3.17	2.93	3.04	3.04	0.00	0.00	0.00
Offsite Worker Travel	0.14	0.32	0.43	0.60	0.73	0.88	1.13	1.26	1.22	1.15	1.15	1.19	1.05	0.88	0.77	0.49	0.25	0.14
	CO (lbs/day)																	
Onsite Off-Road Equipment	71.38	101.61	127.16	141.67	131.04	130.09	113.50	113.63	114.72	118.46	83.32	67.29	71.26	61.42	25.42	24.40	17.52	11.92
Onsite Vehicle	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.01	0.00	0.00
Onsite Off-Road + Onsite Vehicle	71.41	101.65	127.20	141.70	131.08	130.13	113.54	113.67	114.77	118.50	83.36	67.33	71.30	61.46	25.46	24.41	17.52	11.92
Offsite Delivery and Haul Trucks	1.55	1.61	1.61	1.51	1.70	1.57	1.57	1.51	1.63	1.51	1.51	1.63	1.51	1.57	1.57	0.00	0.00	0.00
Offsite Worker Travel	1.56	3.64	4.86	6.90	8.34	10.11	13.00	14.44	13.96	13.16	13.16	13.64	12.04	10.11	8.83	5.70	2.85	1.65
	SO2 (lbs/day)																	
Onsite Off-Road Equipment	0.12	0.17	0.22	0.24	0.22	0.22	0.19	0.19	0.19	0.20	0.14	0.11	0.12	0.10	0.04	0.03	0.02	0.02
Onsite Vehicle	1.90E-04	2.02E-04	2.06E-04	2.08E-04	2.35E-04	2.26E-04	2.36E-04	2.33E-04	2.46E-04	2.29E-04	2.29E-04	2.45E-04	2.25E-04	2.26E-04	2.22E-04	2.02E-05	1.01E-05	5.86E-06
Onsite Off-Road + Onsite Vehicle	0.12	0.17	0.22	0.24	0.22	0.22	0.19	0.19	0.19	0.20	0.14	0.11	0.12	0.10	0.04	0.03	0.02	0.02
Offsite Delivery and Haul Trucks	1.01E-02	1.04E-02	1.04E-02	1.01E-02	1.13E-02	1.05E-02	1.05E-02	1.01E-02	1.09E-02	1.01E-02	1.01E-02	1.09E-02	1.01E-02	1.05E-02	1.05E-02	0.00E+00	0.00E+00	0.00E+00
Offsite Worker Travel	4.78E-03	1.11E-02	1.49E-02	2.29E-02	2.77E-02	3.35E-02	4.31E-02	4.79E-02	4.63E-02	4.37E-02	4.37E-02	4.52E-02	3.99E-02	3.35E-02	2.93E-02	2.02E-02	1.01E-02	5.86E-03

TABLE C-6-11 (CONT.)

Construction of the Proposed P3 – Summer (Peak) Daily Emissions

CalEEMod Results (Combustion Emissions)																		
Project Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
	PM10 (lbs/day)																	
Onsite Off-Road Equipment	0.19	0.28	0.35	0.38	0.35	0.35	0.31	0.30	0.31	0.32	0.22	0.17	0.18	0.16	0.06	0.06	0.04	0.03
Onsite Vehicle	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	0.00	0.00
Onsite Off-Road + Onsite Vehicle	0.19	0.28	0.35	0.38	0.35	0.35	0.31	0.30	0.31	0.32	0.22	0.17	0.19	0.16	0.06	0.06	0.04	0.03
Offsite Delivery and Haul Trucks	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.06	0.05	0.05	0.06	0.05	0.05	0.05	0.00	0.00	0.00
Offsite Worker Travel	2.66E-03	6.21E-03	8.28E-03	1.26E-02	1.53E-02	1.85E-02	2.38E-02	2.65E-02	2.56E-02	2.41E-02	2.41E-02	2.50E-02	2.20E-02	1.85E-02	1.62E-02	1.11E-02	5.55E-03	3.21E-03
	PM2.5 (lbs/day)																	
Onsite Off-Road Equipment	0.19	0.28	0.35	0.38	0.35	0.35	0.31	0.30	0.31	0.32	0.22	0.17	0.18	0.16	0.06	0.06	0.04	0.03
Onsite Vehicle	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	0.00	0.00
Onsite Off-Road + Onsite Vehicle	0.19	0.28	0.35	0.38	0.35	0.35	0.31	0.30	0.31	0.32	0.22	0.17	0.19	0.16	0.06	0.06	0.04	0.03
Offsite Delivery and Haul Trucks	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.00
Offsite Worker Travel	2.46E-03	5.75E-03	7.67E-03	1.17E-02	1.42E-02	1.72E-02	2.21E-02	2.45E-02	2.37E-02	2.23E-02	2.23E-02	2.32E-02	2.04E-02	1.72E-02	1.50E-02	1.03E-02	5.14E-03	2.98E-03
	CO2 (lbs/day)																	
Onsite Off-Road Equipment	11,729	17,066	21,433	23,373	21,365	21,240	18,634	18,464	18,726	19,337	13,424	10,478	11,262	9,658	3,593	3,377	2,229	1,516
Onsite Vehicle	18.40	19.59	19.88	19.46	22.04	20.94	21.65	21.33	22.63	21.01	21.01	22.55	20.73	20.94	20.62	1.45	0.72	0.42
Onsite Off-Road + Onsite Vehicle	11,748	17,085	21,453	23,393	21,387	21,261	18,656	18,485	18,749	19,358	13,445	10,501	11,283	9,679	3,614	3,379	2,230	1,517
Offsite Delivery and Haul Trucks	984	1,021	1,021	968	1,089	1,006	1,006	968	1,046	968	968	1,046	968	1,006	1,006	0	0	0
Offsite Worker Travel	370	862	1,150	1,708	2,066	2,503	3,218	3,575	3,456	3,257	3,257	3,377	2,979	2,503	2,185	1,449	725	419
	CH4 (lbs/day)																	
Onsite Off-Road Equipment	3.59	5.22	6.58	7.23	6.59	6.55	5.73	5.65	5.74	5.94	4.11	3.20	3.45	2.99	1.11	1.09	0.72	0.49
Onsite Vehicle	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	0.00	0.00
Onsite Off-Road + Onsite Vehicle	3.59	5.22	6.58	7.23	6.59	6.55	5.73	5.65	5.74	5.94	4.11	3.20	3.45	2.99	1.11	1.09	0.72	0.49
Offsite Delivery and Haul Trucks	5.46E-03	5.67E-03	5.67E-03	5.46E-03	6.14E-03	5.67E-03	5.67E-03	5.46E-03	5.89E-03	5.46E-03	5.46E-03	5.89E-03	5.46E-03	5.67E-03	5.67E-03	0.00E+00	0.00E+00	0.00E+00
Offsite Worker Travel	0.02	0.04	0.05	0.07	0.09	0.11	0.14	0.15	0.15	0.14	0.14	0.14	0.13	0.11	0.09	0.06	0.03	0.02
	N2O (lbs/day)																	
Onsite Off-Road Equipment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Onsite Vehicle	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	0.00	0.00
Onsite Off-Road + Onsite Vehicle	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	0.00	0.00
Offsite Delivery and Haul Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Offsite Worker Travel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CO2e (lbs/day)																	
Onsite Off-Road Equipment	11,805	17,175	21,571	23,525	21,503	21,377	18,755	18,582	18,847	19,461	13,510	10,545	11,335	9,721	3,616	3,400	2,244	1,526
Onsite Vehicle	18.40	19.59	19.88	19.46	22.04	20.94	21.66	21.33	22.63	21.01	21.01	22.55	20.74	20.94	20.62	1.45	0.73	0.42
Onsite Off-Road + Onsite Vehicle	11,823	17,195	21,591	23,545	21,525	21,398	18,776	18,604	18,870	19,482	13,531	10,568	11,356	9,742	3,637	3,402	2,245	1526.87
Offsite Delivery and Haul Trucks	984	1,022	1,022	968	1,089	1,006	1,006	968	1,046	968	968	1,046	968	1,006	1,006	0	0	0
Offsite Worker Travel	369.9607	863.2416	1150.989	1,709.72	2,067.57	2,504.94	3,220.63	3,578.48	3,459.20	3,260.39	3,260.39	3379.674	2982.066	2504.935	2186.848	1450.314	725.1571	419.8278

TABLE C-6-12

Construction of the Proposed P3 – Winter (Peak) Daily Emissions

Onsite Fugitive Dust																		
Project Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
	PM10 (lbs/day)																	
Onsite Fugitive (Off-Road)	0.00	0.00	3.19	3.19	0.00	0.00	0.00	0.00	0.26	0.26	0.26	0.00	0.26	0.26	0.00	0.00	0.00	0.00
Onsite Fugitive (Onsite Vehicle)	2.74	2.84	2.84	2.74	3.08	2.84	2.85	2.74	2.96	2.74	2.74	2.96	2.74	2.84	2.84	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	2.74	2.84	6.04	5.93	3.08	2.84	2.85	2.74	3.22	3.00	3.00	2.96	3.00	3.10	2.84	0.00	0.00	0.00
Offsite Fugitive - Delivery and Haul Trucks (Paved)	0.23	0.24	0.24	0.23	0.26	0.24	0.24	0.23	0.25	0.23	0.23	0.25	0.23	0.24	0.24	0.00	0.00	0.00
Offsite Fugitive - Delivery and Haul Trucks (Unpaved)	256.38	266.24	266.24	256.38	288.43	266.24	266.24	256.38	276.89	256.38	256.38	276.89	256.38	266.24	266.24	0.00	0.00	0.00
Offsite Fugitive - Worker Travel	0.38	0.88	1.18	1.81	2.19	2.65	3.40	3.78	3.66	3.45	3.45	3.57	3.15	2.65	2.31	1.60	0.80	0.46
	PM2.5 (lbs/day)																	
Onsite Fugitive (Off-Road)	0.00	0.00	1.64	1.64	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.00	0.03	0.03	0.00	0.00	0.00	0.00
Onsite Fugitive (Onsite Vehicle)	0.27	0.28	0.28	0.27	0.31	0.28	0.28	0.27	0.30	0.27	0.27	0.30	0.27	0.28	0.28	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	0.27	0.28	1.93	1.92	0.31	0.28	0.28	0.27	0.32	0.30	0.30	0.30	0.30	0.31	0.28	0.00	0.00	0.00
Offsite Fugitive - Delivery and Haul Trucks (Paved)	0.06	0.07	0.07	0.06	0.07	0.07	0.07	0.06	0.07	0.06	0.06	0.07	0.06	0.07	0.07	0.00	0.00	0.00
Offsite Fugitive - Delivery and Haul Trucks (Unpaved)	25.56	26.54	26.54	25.56	28.76	26.54	26.54	25.56	27.61	25.56	25.56	27.61	25.56	26.54	26.54	0.00	0.00	0.00
Offsite Fugitive - Worker Travel	0.10	0.24	0.31	0.48	0.58	0.71	0.91	1.01	0.98	0.92	0.92	0.95	0.84	0.71	0.62	0.43	0.21	0.12

CalEEMod Results (Combustion Emissions)																		
Project Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
	ROG (lbs/day)																	
Onsite Off-Road Equipment	1.81	2.68	3.34	3.76	3.43	3.40	2.99	2.95	3.00	3.11	2.13	1.63	1.76	1.51	0.52	0.49	0.31	0.20
Onsite Vehicle	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	0.00	0.00
Onsite Off-Road + Onsite Vehicle	1.81	2.69	3.35	3.76	3.43	3.40	2.99	2.95	3.00	3.11	2.13	1.64	1.76	1.51	0.52	0.49	0.31	0.20
Offsite Delivery and Haul Trucks	0.15	0.16	0.16	0.15	0.17	0.16	0.16	0.15	0.16	0.15	0.15	0.16	0.15	0.16	0.16	0.00	0.00	0.00
Offsite Worker Travel	0.05	0.12	0.17	0.23	0.28	0.34	0.43	0.48	0.47	0.44	0.44	0.46	0.40	0.34	0.29	0.19	0.09	0.05
	NOx (lbs/day)																	
Onsite Off-Road Equipment	36.98	53.08	66.48	73.61	68.50	67.86	59.72	61.17	59.70	59.77	39.97	31.84	33.68	30.10	12.65	11.97	9.36	6.02
Onsite Vehicle	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	37.05	53.14	66.54	73.67	68.57	67.92	59.78	61.22	59.76	59.83	40.03	31.90	33.74	30.16	12.71	11.97	9.36	6.02
Offsite Delivery and Haul Trucks	3.34	3.46	3.46	3.05	3.43	3.16	3.16	3.05	3.29	3.05	3.05	3.29	3.05	3.16	3.16	0.00	0.00	0.00
Offsite Worker Travel	0.16	0.37	0.50	0.71	0.85	1.04	1.33	1.48	1.43	1.35	1.35	1.40	1.23	1.04	0.90	0.58	0.29	0.17
	CO (lbs/day)																	
Onsite Off-Road Equipment	71.38	101.61	127.16	141.67	131.04	130.09	113.50	113.63	114.72	118.46	83.32	67.29	71.26	61.42	25.42	24.40	17.52	11.92
Onsite Vehicle	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.05	0.04	0.04	0.04	0.01	0.00	0.00
Onsite Off-Road + Onsite Vehicle	71.41	101.65	127.20	141.71	131.08	130.13	113.55	113.68	114.77	118.50	83.37	67.33	71.31	61.46	25.46	24.41	17.52	11.92
Offsite Delivery and Haul Trucks	1.79	1.86	1.86	1.76	1.98	1.83	1.83	1.76	1.90	1.76	1.76	1.90	1.76	1.83	1.83	0.00	0.00	0.00
Offsite Worker Travel	1.46	3.40	4.54	6.41	7.76	9.40	12.08	13.43	12.98	12.23	12.23	12.68	11.19	9.40	8.20	5.28	2.64	1.53
	SO2 (lbs/day)																	
Onsite Off-Road Equipment	0.12	0.17	0.22	0.24	0.22	0.22	0.19	0.19	0.19	0.20	0.14	0.11	0.12	0.10	0.04	0.03	0.02	0.02
Onsite Vehicle	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	0.00	0.00
Onsite Off-Road + Onsite Vehicle	0.12	0.17	0.22	0.24	0.22	0.22	0.19	0.19	0.19	0.20	0.14	0.11	0.12	0.10	0.04	0.03	0.02	0.02
Offsite Delivery and Haul Trucks	1.01E-02	1.04E-02	1.04E-02	1.01E-02	1.13E-02	1.04E-02	1.04E-02	1.01E-02	1.09E-02	1.01E-02	1.01E-02	1.09E-02	1.01E-02	1.04E-02	1.04E-02	0.00E+00	0.00E+00	0.00E+00
Offsite Worker Travel	4.54E-03	1.06E-02	1.41E-02	2.18E-02	2.63E-02	3.19E-02	4.10E-02	4.55E-02	4.40E-02	4.15E-02	4.15E-02	4.30E-02	3.80E-02	3.19E-02	2.78E-02	1.92E-02	9.61E-03	5.57E-03

TABLE C-6-12 (CONT.)

Construction of the Proposed P3 – Winter (Peak) Daily Emissions

CalEEMod Results (Combustion Emissions)																		
Project Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
									PM10 (lbs/day)									
Onsite Off-Road Equipment	0.19	0.28	0.35	0.38	0.35	0.35	0.31	0.30	0.31	0.32	0.22	0.17	0.18	0.16	0.06	0.06	0.04	0.03
Onsite Vehicle	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	0.00	0.00
Onsite Off-Road + Onsite Vehicle	0.19	0.28	0.35	0.38	0.35	0.35	0.31	0.30	0.31	0.32	0.22	0.17	0.19	0.16	0.06	0.06	0.04	0.03
Offsite Delivery and Haul Trucks	0.05	0.06	0.06	0.05	0.06	0.05	0.05	0.05	0.06	0.05	0.05	0.06	0.05	0.05	0.05	0.00	0.00	0.00
Offsite Worker Travel	2.66E-03	6.21E-03	8.28E-03	1.26E-02	1.53E-02	1.85E-02	2.38E-02	2.65E-02	2.56E-02	2.41E-02	2.41E-02	2.50E-02	2.20E-02	1.85E-02	1.62E-02	1.11E-02	5.55E-03	3.21E-03
									PM2.5 (lbs/day)									
Onsite Off-Road Equipment	0.19	0.28	0.35	0.38	0.35	0.35	0.31	0.30	0.31	0.32	0.22	0.17	0.18	0.16	0.06	0.06	0.04	0.03
Onsite Vehicle	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	0.00	0.00
Onsite Off-Road + Onsite Vehicle	0.19	0.28	0.35	0.38	0.35	0.35	0.31	0.30	0.31	0.32	0.22	0.17	0.19	0.16	0.06	0.06	0.04	0.03
Offsite Delivery and Haul Trucks	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.00
Offsite Worker Travel	2.46E-03	5.75E-03	7.67E-03	1.17E-02	1.42E-02	1.72E-02	2.21E-02	2.45E-02	2.37E-02	2.23E-02	2.23E-02	2.32E-02	2.04E-02	1.72E-02	1.50E-02	1.03E-02	5.14E-03	2.98E-03
									CO2 (lbs/day)									
Onsite Off-Road Equipment	11,729	17,066	21,433	23,373	21,365	21,240	18,634	18,464	18,726	19,337	13,424	10,478	11,262	9,658	3,593	3,377	2,229	1,516
Onsite Vehicle	18.37	19.53	19.80	19.36	21.92	20.80	21.48	21.14	22.44	20.84	20.84	22.37	20.57	20.80	20.50	1.38	0.69	0.40
Onsite Off-Road + Onsite Vehicle	11,748	17,085	21,452	23,393	21,387	21,261	18,656	18,485	18,749	19,357	13,445	10,500	11,283	9,679	3,613	3,379	2,230	1516.55
Offsite Delivery and Haul Trucks	983	1,021	1,021	967	1,088	1,005	1,005	967	1,045	967	967	1,045	967	1,005	1,005	0	0	0
Offsite Worker Travel	352	820	1,094	1,625	1,965	2,380	3,060	3,401	3,287	3,098	3,098	3,212	2,834	2,380	2,078	1,378	689	399
									CH4 (lbs/day)									
Onsite Off-Road Equipment	3.59	5.22	6.58	7.23	6.59	6.55	5.73	5.65	5.74	5.94	4.11	3.20	3.45	2.99	1.11	1.09	0.72	0.49
Onsite Vehicle	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	0.00	0.00
Onsite Off-Road + Onsite Vehicle	3.59	5.22	6.58	7.23	6.59	6.55	5.73	5.65	5.74	5.94	4.11	3.20	3.45	2.99	1.11	1.09	0.72	0.49
Offsite Delivery and Haul Trucks	5.49E-03	5.71E-03	5.71E-03	5.49E-03	6.18E-03	5.70E-03	5.70E-03	5.49E-03	5.93E-03	5.49E-03	5.49E-03	5.93E-03	5.49E-03	5.70E-03	5.70E-03	0.00E+00	0.00E+00	0.00E+00
Offsite Worker Travel	0.02	0.04	0.05	0.07	0.09	0.11	0.14	0.15	0.15	0.14	0.14	0.14	0.13	0.11	0.09	0.06	0.03	0.02
									N2O (lbs/day)									
Onsite Off-Road Equipment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Onsite Vehicle	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	0.00	0.00
Onsite Off-Road + Onsite Vehicle	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	0.00	0.00
Offsite Delivery and Haul Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Offsite Worker Travel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
									CO2e (lbs/day)									
Onsite Off-Road Equipment	11,805	17,175	21,571	23,525	21,503	21,377	18,755	18,582	18,847	19,461	13,510	10,545	11,335	9,721	3,616	3,400	2,244	1,526
Onsite Vehicle	18.37	19.53	19.81	19.37	21.92	20.80	21.48	21.14	22.45	20.84	20.84	22.37	20.58	20.80	20.50	1.38	0.69	0.40
Onsite Off-Road + Onsite Vehicle	11,823	17,195	21,591	23,545	21,525	21,398	18,776	18,603	18,869	19,482	13,531	10,568	11,355	9,742	3,637	3,402	2,245	1526.85
Offsite Delivery and Haul Trucks	983	1,021	1,021	968	1,089	1,005	1,005	968	1,045	968	968	1,045	968	1,005	1,005	0	0	0
Offsite Worker Travel	352	821	1,095	1,626	1,967	2,383	3,063	3,404	3,290	3,101	3,101	3,215	2,836	2,383	2,080	1,379	690	399

TABLE C-6-13
Construction of the Proposed P3 – CalEEMod Input Data

Project Name	Puente Power Project	
District	Ventura County	
Wind Speed	2.6	m/s
Precipitation Frequency	31	days/year
Climate Zone	8	
Urbanization Level	Rural	
Expected Operational Year	2021	
Utility Company	Southern California Edison	
CO2 Intensity Factor	630.89	
CH4 Intensity Factor	0.029	
N2O Intensity Factor	0.006	

CalEEMod Phase Name	Phase Type	Start Date	End Date	# day/Week	Number of Days	Month	# of Days, Rolling 12-month
Grading 1	Grading	10/1/2018	10/31/2018	6	27	1	
Grading 2	Grading	11/1/2018	11/30/2018	6	26	2	
Grading 3	Grading	12/1/2018	12/31/2018	6	26	3	
Grading 4	Grading	1/1/2019	1/31/2019	6	27	4	
Grading 5	Grading	2/1/2019	2/28/2019	6	24	5	
Grading 6	Grading	3/1/2019	3/31/2019	6	26	6	
Grading 7	Grading	4/1/2019	4/30/2019	6	26	7	
Grading 8	Grading	5/1/2019	5/31/2019	6	27	8	
Grading 9	Grading	6/1/2019	6/30/2019	6	25	9	
Grading 10	Grading	7/1/2019	7/31/2019	6	27	10	
Grading 11	Grading	8/1/2019	8/31/2019	6	27	11	
Grading 12	Grading	9/1/2019	9/30/2019	6	25	12	313
Grading 13	Grading	10/1/2019	10/31/2019	6	27	13	313
Grading 14	Grading	11/1/2019	11/30/2019	6	26	14	313
Grading 15	Grading	12/1/2019	12/31/2019	6	26	15	313
Grading 16	Grading	1/1/2020	1/31/2020	6	27	16	313
Grading 17	Grading	2/1/2020	2/29/2020	6	25	17	314
Grading 18	Grading	3/1/2020	3/31/2020	6	26	18	314

TABLE C-6-14
Construction of the Proposed P3 – CalEEMod Equipment Schedule Input

				2018			2019												2020			
	Fuel Type	**CalEEMod Equip Type**	**HP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JLY**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	
Project Month				**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**Total**
Construction Equipment																						
Pickup truck	Gas	Off-Highway Trucks	150	2	2	2	2	2	2	2	3	3	3	3	3	3	3	2	2	2	1	42
1-ton flatbed truck	Gas	Off-Highway Trucks	150																			0
Tractor	Diesel	Off-Highway Tractors	200	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	13
Forklift	Gas	Forklifts	40	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	22
Fuel/lube truck	Gas	Off-Highway Trucks	150	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
M2250 ringer /2250 crawler crane	Diesel	Cranes	500	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	5
150-ton crawler	Diesel	Crawler Tractors	300	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	3
Hydraulic crane (55-ton)	Diesel	Cranes	300	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	15
Hydraulic crane (45-ton)	Diesel	Cranes	250	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	14
Articulating boom manlift (120, 80, 60, and 40)	Gas	Aerial Lifts	75	0	0	0	0	0	0	0	0	2	4	6	6	6	4	2	2	1	1	34
Air compressor	Gas	Air Compressors	50	1	1	1	1	1	1	1	2	2	2	2	2	2	1	0	0	0	0	20
Backhoe loader	Diesel	Tractors/Loaders/Backhoes	80	0	0	0	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	10
Front-end loader	Diesel	Rubber Tired Loaders	130	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	9
Dump truck (30-ton)	Diesel	Off-Highway Trucks	300	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	5
Hydraulic excavator	Diesel	Excavators	250	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	7
Bulldozer	Diesel	Rubber Tired Dozers	300	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Bulldozer w/ripper	Diesel	Rubber Tired Dozers	300	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Vibratory roller	Gas	Rollers	125	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	7
Walk behind vibratory roller	Gas	Other Construction Equipment	25	0	0	0	1	2	2	1	1	1	1	0	0	0	0	0	0	0	0	9
Motor grader	Diesel	Graders	200	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	4
Jumping jack compactors	Gas	Plate Compactors	7.5	0	0	0	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	8
Water truck	Diesel	Off-Highway Trucks	300	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	14
Concrete pumper truck	Diesel	Off-Highway Trucks	350	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	4
Concrete mixer truck	Diesel	Off-Highway Trucks	250	0	0	0	0	0	0	2	2	2	1	0	0	0	0	0	0	0	0	7
Welding machine (diesel)	Diesel	Welders	25	0	0	0	1	1	1	1	2	2	2	2	1	1	1	1	0	0	0	16
Light plant	Gas	Other Construction Equipment	25	0	0	0	0	0	0	1	1	1	2	2	2	2	2	0	0	0	0	13
Light plant	Gas	Other Construction Equipment	25		1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0	8
Subtotal (gas and diesel)				**8**	**13**	**16**	**21**	**21**	**20**	**19**	**23**	**26**	**27**	**25**	**22**	**22**	**19**	**9**	**8**	**6**	**4**	309
Demolition																						0
Hydraulic excavator	Diesel	Excavators	250	2	2	3	3	3	3	2	1	1	1	0	0	0	0	0	0	0	0	21
1-ton flatbed truck	Gas	Off-Highway Trucks	150	1	1	2	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	14
Forklift	Gas	Forklifts	40	1	2	2	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	13
Fuel/lube truck	Gas	Off-Highway Trucks	150	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	8
Water truck	Diesel	Off-Highway Trucks	300	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	10
Articulating boom manlift (120, 80.60, and 40)	Gas	Aerial Lifts	75	2	2	2	3	3	3	2	1	1	1	0	0	0	0	0	0	0	0	20
Air compressor	Gas	Air Compressors	50	1	2	2	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0	16
Hydraulic crane (75-ton)	Diesel	Cranes	350	1	2	2	3	3	3	2	1	1	1	0	0	0	0	0	0	0	0	19
Subtotal (gas and diesel)				**10**	**13**	**15**	**17**	**17**	**17**	**12**	**8**	**6**	**6**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	121
TOTAL (ALL)				**18**	**26**	**31**	**38**	**38**	**37**	**31**	**31**	**32**	**33**	**25**	**22**	**22**	**19**	**9**	**8**	**6**	**4**	430

TABLE C-6-15

Construction of the Proposed P3 – CalEEMod Vehicle Trips Input

	2018			2019												2020		
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
Project Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Craft/Trade																		
Boilermakers	0	0	0	0	0	0	0	0	5	10	10	10	10	10	5	3	0	0
Carpenters	0	0	1	6	6	12	12	12	10	6	6	6	6	4	4	2	2	2
Electricians	2	4	6	8	8	8	8	10	10	10	10	10	10	8	8	6	4	2
Ironworkers	0	0	1	2	8	8	8	8	2	2	2	2	0	0	0	0	0	0
Laborers	1	2	4	4	4	6	10	10	10	6	6	6	6	4	4	4	2	2
Pipe Fitters	0	0	0	0	0	1	10	10	10	10	10	10	10	10	10	4	2	0
Painters and Insulators	0	0	0	0	0	0	2	2	2	4	4	8	8	4	2	2	2	0
Cement Finisher	0	0	0	4	6	6	6	6	6	2	2	2	0	0	0	0	0	0
Millwrights	0	0	0	0	0	0	2	8	8	8	8	8	8	6	6	2	0	0
Operators	1	4	4	6	6	6	6	6	6	6	6	6	2	2	2	2	2	0
Teamsters	0	0	0	0	0	0	1	2	2	2	2	2	0	0	0	0	0	0
Number of Craft Labor (Subtotal)	**4**	**10**	**16**	**30**	**38**	**47**	**65**	**74**	**71**	**66**	**66**	**70**	**60**	**48**	**41**	**25**	**14**	**6**
Construction Staff																		
Construction Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mechanical/Piping Superintendent						1	1	1	1	1	1	1	1	1	1	1		
Civil/Structural Superintendent		1	1	1	1	1	1	1	1	1	1							
Electrical Superintendent	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Field Engineering Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mechanical/Piping Engineer						1	1	1	1	1	1	1	1	1	1	1		
Civil/Structural Engineer		1	1	1	1	1	1	1	1	1	1	1	1	1				
Electrical Engineer					1	1	1	1	1	1	1	1	1	1	1	1		
Business Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Project Controls Manager		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Document Control		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Payroll Clerk		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Procurement Manager			1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Receiving Manager				1	1	1	1	1	1	1	1	1	1	1	1	1		
Quality Control Manager		1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Safety Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of Construction Staff (Subtotal)	**5**	**11**	**12**	**13**	**14**	**16**	**16**	**16**	**16**	**16**	**16**	**15**	**15**	**15**	**14**	**13**	**5**	**5**
Worker Trips (trips/day)	**9**	**21**	**28**	**43**	**52**	**63**	**81**	**90**	**87**	**82**	**82**	**85**	**75**	**63**	**55**	**38**	**19**	**11**
Worker Trips Length (miles)	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Worker Trips, Percent Paved (%)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

TABLE C-6-15 (CONT.)

Construction of the Proposed P3 – CalEEMod Vehicle Trips Input

Truck Delivery and Hauling Trucks (Average per month)																		
Project total	1925																	
Equipment Delivery and Haul Trucks Trips per month	**128**	**128**	**128**	**128**	**128**	**128**	**128**	**128**	**128**	**128**	**128**	**128**	**128**	**128**	**128**	**0**	**0**	**0**
Delivery Truck Trips Length (miles)	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Delivery Truck Trips, Percent Paved (%)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Note:

Worker trips and truck trips length are assumed to be from the LA County line to the project site using HW 101 (a one-way trip of 30 miles, roundtrip 60 miles)

TABLE C-6-16
Decommissioning of the MGS Units 1 and 2 – Daily and Annual Emissions

	Maximum Daily Emissions (lbs/day)					
	NOx	CO	VOC	SOx	PM10	PM2.5
	Onsite					
Off-Road Equipment (combustion)	11.29	21.71	0.60	0.04	0.06	0.06
Off-Road Equipment and Onsite Vehicle (combustion)	11.29	21.71	0.60	0.04	0.06	0.06
Onsite Vehicle - Fugitive Dust					4.2E-04	1.1E-04
Subtotal (Fugitive Dust)					4.2E-04	1.1E-04
Subtotal (Onsite)	11.29	21.71	0.60	0.04	0.06	0.06
	Offsite					
Worker Travel (combustion)	0.15	1.50	0.05	0.01	0.003	0.003
Delivery and Haul Truck Emissions (combustion)	0	0	0	0	0	0
Worker Travel - Fugitive Dust					0.42	0.11
Delivery and Haul Truck - Fugitive Dust					0	0
Subtotal (Fugitive Dust)					0.42	0.11
Subtotal (Offsite)	0.15	1.50	0.05	0.01	0.42	0.11
Total	11.44	23.21	0.65	0.04	0.49	0.18
	Peak Annual Emissions (tons, 3-month Total)					
	NOx	CO	VOC	SOx	PM10	PM2.5
	Onsite					
Off-Road Equipment (combustion)	0.44	0.85	0.02	0.001	0.002	0.002
Off-Road Equipment and Onsite Vehicle (combustion)	0.44	0.85	0.02	0.001	0.002	0.002
Onsite Vehicle - Fugitive Dust					1.6E-05	4.3E-06
Subtotal (Fugitive Dust)					1.6E-05	4.3E-06
Subtotal (Onsite)	0.44	0.85	0.02	0.001	0.002	0.0024
	Offsite					
Worker Travel (combustion)	0.01	0.05	0.002	2.1E-04	1.2E-04	1.2E-04
Delivery and Haul Truck Emissions (combustion)	0	0	0	0	0	0
Worker Travel - Fugitive Dust					0.02	0.004
Delivery and Haul Truck - Fugitive Dust					0	0
Subtotal (Fugitive Dust)					0.02	0.004
Subtotal (Offsite)	0.01	0.05	0.002	0.0002	0.02	0.004
Total	0.45	0.90	0.03	0.002	0.02	0.01

TABLE C-6-17
Decommissioning of the MGS Units 1 and 2 – Greenhouse Gas Emission Calculations

	GHG Emissions (MT, Total for 3-month Period)			
	CO_2	CH_4	N_2O	CO_2e
Onsite Off-Road Equipment	129	0.04	0.00	130
Onsite Off-Road Equipment and Onsite Vehicle	129	0.04	0.00	130
Offsite Worker Travel	13	0.001	0.00	13
Offsite Delivery and Haul Truck Emissions	0	0	0	0
Total	142	0.04	0.00	143

TABLE C-6-18

Decommissioning of the MGS Units 1 and 2 – Monthly and Annual Emission Calculations

Onsite Fugitive Dust				
Project Month		**1**	**2**	**3**
			PM10	
Onsite Fugitive (Off-Road)	(tons/month)	0.00	0.00	0.00
Onsite Fugitive (Onsite Vehicle)	(tons/month)	5.36E-06	5.36E-06	5.36E-06
Onsite Off-Road + Onsite Vehicle	(tons/month)	5.36E-06	5.36E-06	5.36E-06
Offsite Fugitive - Delivery and Haul Trucks (Paved)	(tons/month)	0	0	0
Offsite Fugitive - Delivery and Haul Trucks (Unpaved)	(tons/month)	0	0	0
Offsite Fugitive - Worker Travel	(tons/month)	5.36E-03	5.36E-03	5.36E-03
Onsite Fugitive (Off-Road)	3-month total (tons)	0.00E+00	0.00E+00	0.00E+00
Onsite Fugitive (Onsite Vehicle)	3-month total (tons)	5.36E-06	1.07E-05	1.61E-05
Offsite Fugitive - Delivery and Haul Trucks (Paved)	3-month total (tons)	0.00E+00	0.00E+00	0.00E+00
Offsite Fugitive - Worker Travel	3-month total (tons)	5.36E-03	1.07E-02	1.61E-02
			PM2.5	
Onsite Fugitive (Off-Road)	(tons/month)	0.00E+00	0.00E+00	0.00E+00
Onsite Fugitive (Onsite Vehicle)	(tons/month)	1.43E-06	1.43E-06	1.43E-06
Onsite Off-Road + Onsite Vehicle	(tons/month)	1.43E-06	1.43E-06	1.43E-06
Offsite Fugitive - Delivery and Haul Trucks (Paved)	(tons/month)	0	0	0
Offsite Fugitive - Delivery and Haul Trucks (Unpaved)	(tons/month)	0	0	0
Offsite Fugitive - Worker Travel	(tons/month)	1.43E-03	1.43E-03	1.43E-03
Onsite Fugitive (Off-Road)	3-month total (tons)	0.00E+00	0.00E+00	0.00E+00
Onsite Fugitive (Onsite Vehicle)	3-month total (tons)	1.43E-06	2.86E-06	4.29E-06
Offsite Fugitive - Delivery and Haul Trucks (Paved)	3-month total (tons)	0.00E+00	0.00E+00	0.00E+00
Offsite Fugitive - Worker Travel	3-month total (tons)	1.43E-03	2.86E-03	4.29E-03

CalEEMod Results (Combustion Emissions)				
Project Month		**1**	**2**	**3**
			ROG	
Onsite Off-Road Equipment	(tons/month)	7.79E-03	7.79E-03	7.79E-03
Onsite Vehicle	(tons/month)	6.20E-07	6.20E-07	6.20E-07
Onsite Off-Road + Onsite Vehicle	(tons/month)	7.79E-03	7.79E-03	7.79E-03
Offsite Delivery and Haul Trucks	(tons/month)	0	0	0
Offsite Worker Travel	(tons/month)	6.20E-04	6.20E-04	6.20E-04
Onsite Off-Road Equipment	3-month total (tons)	0.01	0.02	0.02
Onsite Off-Road + Onsite Vehicle	3-month total (tons)	0.01	0.02	0.02
Offsite Delivery and Haul Trucks	3-month total (tons)	0.00	0.00	0.00
Offsite Worker Travel	3-month total (tons)	0.00	0.00	0.00
			NOx	
Onsite Off-Road Equipment	(tons/month)	0.15	0.15	0.15
Onsite Vehicle	(tons/month)	1.93E-06	1.93E-06	1.93E-06
Onsite Off-Road + Onsite Vehicle	(tons/month)	1.47E-01	1.47E-01	1.47E-01
Offsite Delivery and Haul Trucks	(tons/month)	0	0	0
Offsite Worker Travel	(tons/month)	0.002	0.002	0.002
Onsite Off-Road Equipment	3-month total (tons)	0.15	0.29	0.44
Onsite Off-Road + Onsite Vehicle	3-month total (tons)	0.15	0.29	0.44
Offsite Delivery and Haul Trucks	3-month total (tons)	0.00	0.00	0.00
Offsite Worker Travel	3-month total (tons)	0.00	0.00	0.01
			CO	
Onsite Off-Road Equipment	(tons/month)	0.282	0.282	0.282
Onsite Vehicle	(tons/month)	1.82E-05	1.82E-05	1.82E-05
Onsite Off-Road + Onsite Vehicle	(tons/month)	2.82E-01	2.82E-01	2.82E-01
Offsite Delivery and Haul Trucks	(tons/month)	0	0	0
Offsite Worker Travel	(tons/month)	0.018	0.018	0.018
Onsite Off-Road Equipment	3-month total (tons)	0.28	0.56	0.85
Onsite Off-Road + Onsite Vehicle	3-month total (tons)	0.28	0.56	0.85
Offsite Delivery and Haul Trucks	3-month total (tons)	0.00	0.00	0.00
Offsite Worker Travel	3-month total (tons)	0.02	0.04	0.05

TABLE C-6-18 (CONT.)

Decommissioning of the MGS Units 1 and 2 – Monthly and Annual Emission Calculations

Project Month		1	2	3
		SO2		
Onsite Off-Road Equipment	(tons/month)	4.90E-04	4.90E-04	4.90E-04
Onsite Vehicle	(tons/month)	7.00E-08	7.00E-08	7.00E-08
Onsite Off-Road + Onsite Vehicle	(tons/month)	4.90E-04	4.90E-04	4.90E-04
Offsite Delivery and Haul Trucks	(tons/month)	0	0	0
Offsite Worker Travel	(tons/month)	7.00E-05	7.00E-05	7.00E-05
Onsite Off-Road Equipment	3-month total (tons)	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	3-month total (tons)	0.00	0.00	0.00
Offsite Delivery and Haul Trucks	3-month total (tons)	0.00	0.00	0.00
Offsite Worker Travel	3-month total (tons)	0.00	0.00	0.00
		PM10		
Onsite Off-Road Equipment	(tons/month)	8.00E-04	8.00E-04	8.00E-04
Onsite Vehicle	(tons/month)	4.00E-08	4.00E-08	4.00E-08
Onsite Off-Road + Onsite Vehicle	(tons/month)	8.00E-04	8.00E-04	8.00E-04
Offsite Delivery and Haul Trucks	(tons/month)	0	0	0
Offsite Worker Travel	(tons/month)	4.00E-05	4.00E-05	4.00E-05
Onsite Off-Road Equipment	3-month total (tons)	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	3-month total (tons)	0.00	0.00	0.00
Offsite Delivery and Haul Trucks	3-month total (tons)	0.00	0.00	0.00
Offsite Worker Travel	3-month total (tons)	0.00	0.00	0.00
		PM2.5		
Onsite Off-Road Equipment	(tons/month)	8.00E-04	8.00E-04	8.00E-04
Onsite Vehicle	(tons/month)	4.00E-08	4.00E-08	4.00E-08
Onsite Off-Road + Onsite Vehicle	(tons/month)	8.00E-04	8.00E-04	8.00E-04
Offsite Delivery and Haul Trucks	(tons/month)	0	0	0
Offsite Worker Travel	(tons/month)	4.00E-05	4.00E-05	4.00E-05
Onsite Off-Road Equipment	3-month total (tons)	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	3-month total (tons)	0.00	0.00	0.00
Offsite Delivery and Haul Trucks	3-month total (tons)	0.00	0.00	0.00
Offsite Worker Travel	3-month total (tons)	0.00	0.00	0.00
		CO2		
Onsite Off-Road Equipment	(MT/month)	42.90	42.90	42.90
Onsite Vehicle	(MT/month)	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	(MT/month)	42.90	42.90	42.90
Offsite Delivery and Haul Trucks	(MT/month)	0	0	0
Offsite Worker Travel	(MT/month)	4.31	4.31	4.31
Onsite Off-Road Equipment	3-month total (MT)	43	86	129
Onsite Off-Road + Onsite Vehicle	3-month total (MT)	43	86	129
Offsite Delivery and Haul Trucks	3-month total (MT)	0	0	0
Offsite Worker Travel	3-month total (MT)	4	9	13
		CH4		
Onsite Off-Road Equipment	(MT/month)	0.014	0.014	0.014
Onsite Vehicle	(MT/month)	1.90E-07	1.90E-07	1.90E-07
Onsite Off-Road + Onsite Vehicle	(MT/month)	0.01	0.01	0.01
Offsite Delivery and Haul Trucks	(MT/month)	0	0	0
Offsite Worker Travel	(MT/month)	1.90E-04	1.90E-04	1.90E-04
Onsite Off-Road Equipment	3-month total (MT)	0.01	0.03	0.04
Onsite Off-Road + Onsite Vehicle	3-month total (MT)	0	0	0
Offsite Delivery and Haul Trucks	3-month total (MT)	0.00E+00	0.00E+00	0.00E+00
Offsite Worker Travel	3-month total (MT)	1.90E-04	3.80E-04	5.70E-04

TABLE C-6-18 (CONT.)

Decommissioning of the MGS Units 1 and 2 – Monthly and Annual Emission Calculations

Project Month		**1**	**2**	**3**
		N2O		
Onsite Off-Road Equipment	(MT/month)	0.00	0.00	0.00
Onsite Vehicle	(MT/month)	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	(MT/month)	0.00	0.00	0.00
Offsite Delivery and Haul Trucks	(MT/month)	0.00	0.00	0.00
Offsite Worker Travel	(MT/month)	0.00	0.00	0.00
Onsite Off-Road Equipment	3-month total (MT)	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	3-month total (MT)	0	0	0
Offsite Delivery and Haul Trucks	3-month total (MT)	0.00	0.00	0.00
Offsite Worker Travel	3-month total (MT)	0.00	0.00	0.00
		CO2e		
Onsite Off-Road Equipment	(MT/month)	43.19	43.19	43.19
Onsite Vehicle	(MT/month)	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	(MT/month)	43.19	43.19	43.19
Offsite Delivery and Haul Trucks	(MT/month)	0	0	0
Offsite Worker Travel	(MT/month)	4.32	4.32	4.32
Onsite Off-Road Equipment	3-month total (MT)	43	86	130
Onsite Off-Road + Onsite Vehicle	3-month total (MT)	43	86	130
Offsite Delivery and Haul Trucks	3-month total (MT)	0	0	0
Offsite Worker Travel	3-month total (MT)	4	9	13

TABLE C-6-19

Decommissioning of the MGS Units 1 and 2 – Summer (Peak) Daily Emissions

Onsite Fugitive Dust			
Project Month	**1**	**2**	**3**
	PM10 (lbs/day)		
Onsite Fugitive (Off-Road)	0.00	0.00	0.00
Onsite Fugitive (Onsite Vehicle)	4.20E-04	4.20E-04	4.20E-04
Onsite Off-Road + Onsite Vehicle	4.20E-04	4.20E-04	4.20E-04
Offsite Fugitive - Delivery and Haul Trucks (Paved)	0.00	0.00	0.00
Offsite Fugitive - Delivery and Haul Trucks (Unpaved)	0.00	0.00	0.00
Offsite Fugitive - Worker Travel	0.42	0.42	0.42
	PM2.5 (lbs/day)		
Onsite Fugitive (Off-Road)	0.00	0.00	0.00
Onsite Fugitive (Onsite Vehicle)	1.12E-04	1.12E-04	1.12E-04
Onsite Off-Road + Onsite Vehicle	1.12E-04	1.12E-04	1.12E-04
Offsite Fugitive - Delivery and Haul Trucks (Paved)	0.00	0.00	0.00
Offsite Fugitive - Delivery and Haul Trucks (Unpaved)	0.00	0.00	0.00
Offsite Fugitive - Worker Travel	0.11	0.11	0.11

CalEEMod Results (Combustion Emissions)			
Project Month	**1**	**2**	**3**
	ROG (lbs/day)		
Onsite Off-Road Equipment	0.60	0.60	0.60
Onsite Vehicle	4.96E-05	4.96E-05	4.96E-05
Onsite Off-Road + Onsite Vehicle	0.60	0.60	0.60
Offsite Delivery and Haul Trucks	0.00	0.00	0.00
Offsite Worker Travel	0.05	0.05	0.05
	NOx (lbs/day)		
Onsite Off-Road Equipment	11.29	11.29	11.29
Onsite Vehicle	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	11.29	11.29	11.29
Offsite Delivery and Haul Trucks	0.00	0.00	0.00
Offsite Worker Travel	0.13	0.13	0.13
	CO (lbs/day)		
Onsite Off-Road Equipment	21.71	21.71	21.71
Onsite Vehicle	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	21.71	21.71	21.71
Offsite Delivery and Haul Trucks	0.00	0.00	0.00
Offsite Worker Travel	1.50	1.50	1.50
	SO2 (lbs/day)		
Onsite Off-Road Equipment	0.04	0.04	0.04
Onsite Vehicle	5.32E-06	5.32E-06	5.32E-06
Onsite Off-Road + Onsite Vehicle	0.04	0.04	0.04
Offsite Delivery and Haul Trucks	0.00	0.00	0.00
Offsite Worker Travel	5.32E-03	5.32E-03	5.32E-03

TABLE C-6-19 (CONT.)
Decommissioning of the MGS Units 1 and 2 – Summer (Peak) Daily Emissions

CalEEMod Results (Combustion Emissions)			
Project Month	**1**	**2**	**3**
	PM10 (lbs/day)		
Onsite Off-Road Equipment	0.06	0.06	0.06
Onsite Vehicle	2.92E-06	2.92E-06	2.92E-06
Onsite Off-Road + Onsite Vehicle	0.06	0.06	0.06
Offsite Delivery and Haul Trucks	0.00	0.00	0.00
Offsite Worker Travel	2.92E-03	2.92E-03	2.92E-03
	PM2.5 (lbs/day)		
Onsite Off-Road Equipment	0.06	0.06	0.06
Onsite Vehicle	2.71E-06	2.71E-06	2.71E-06
Onsite Off-Road + Onsite Vehicle	0.06	0.06	0.06
Offsite Delivery and Haul Trucks	0.00	0.00	0.00
Offsite Worker Travel	2.71E-03	2.71E-03	2.71E-03
	CO2 (lbs/day)		
Onsite Off-Road Equipment	3,638	3,638	3,638
Onsite Vehicle	0.38	0.38	0.38
Onsite Off-Road + Onsite Vehicle	3,638	3,638	3,638
Offsite Delivery and Haul Trucks	0	0	0
Offsite Worker Travel	381	381	381
	CH4 (lbs/day)		
Onsite Off-Road Equipment	1.18	1.18	1.18
Onsite Vehicle	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	1.18	1.18	1.18
Offsite Delivery and Haul Trucks	0.00	0.00	0.00
Offsite Worker Travel	0.02	0.02	0.02
	N2O (lbs/day)		
Onsite Off-Road Equipment	0	0	0
Onsite Vehicle	0.00	0.00	0.00
Onsite Off-Road + Onsite Vehicle	0.00	0.00	0.00
Offsite Delivery and Haul Trucks	0	0	0
Offsite Worker Travel	0	0	0
	CO2e (lbs/day)		
Onsite Off-Road Equipment	3,662	3,662	3,662
Onsite Vehicle	0.38	0.38	0.38
Onsite Off-Road + Onsite Vehicle	3,663	3,663	3662.65
Offsite Delivery and Haul Trucks	0	0	0
Offsite Worker Travel	381.66	381.66	381.66

TABLE C-6-20

Decommissioning of the MGS Units 1 and 2 – Winter (Peak) Daily Emissions

Onsite Fugitive Dust			
Project Month	**1**	**2**	**3**
	PM10 (lbs/day)		
Onsite Fugitive (Off-Road)	0	0	0
Onsite Fugitive (Onsite Vehicle)	4.20E-04	4.20E-04	4.20E-04
Onsite Off-Road + Onsite Vehicle	4.20E-04	4.20E-04	4.20E-04
Offsite Fugitive - Delivery and Haul Trucks (Paved)	0	0	0
Offsite Fugitive - Delivery and Haul Trucks (Unpaved)	0	0	0
Offsite Fugitive - Worker Travel	0.42	0.42	0.42
	PM2.5 (lbs/day)		
Onsite Fugitive (Off-Road)	0	0	0
Onsite Fugitive (Onsite Vehicle)	1.12E-04	1.12E-04	1.12E-04
Onsite Off-Road + Onsite Vehicle	1.12E-04	1.12E-04	1.12E-04
Offsite Fugitive - Delivery and Haul Trucks (Paved)	0	0	0
Offsite Fugitive - Delivery and Haul Trucks (Unpaved)	0	0	0
Offsite Fugitive - Worker Travel	0.11	0.11	0.11

CalEEMod Results (Combustion Emissions)			
Project Month	**1**	**2**	**3**
	ROG (lbs/day)		
Onsite Off-Road Equipment	0.60	0.60	0.60
Onsite Vehicle	4.97E-05	4.97E-05	4.97E-05
Onsite Off-Road + Onsite Vehicle	0.60	0.60	0.60
Offsite Delivery and Haul Trucks	0	0	0
Offsite Worker Travel	0.05	0.05	0.05
	NOx (lbs/day)		
Onsite Off-Road Equipment	11.29	11.29	11.29
Onsite Vehicle	1.53E-04	1.53E-04	1.53E-04
Onsite Off-Road + Onsite Vehicle	11.29	11.29	11.29
Offsite Delivery and Haul Trucks	0	0	0
Offsite Worker Travel	0.15	0.15	0.15
	CO (lbs/day)		
Onsite Off-Road Equipment	21.71	21.71	21.71
Onsite Vehicle	1.39E-03	1.39E-03	1.39E-03
Onsite Off-Road + Onsite Vehicle	21.71	21.71	21.71
Offsite Delivery and Haul Trucks	0	0	0
Offsite Worker Travel	1.39	1.39	1.39
	SO2 (lbs/day)		
Onsite Off-Road Equipment	0.04	0.04	0.04
Onsite Vehicle	5.06E-06	5.06E-06	5.06E-06
Onsite Off-Road + Onsite Vehicle	0.04	0.04	0.04
Offsite Delivery and Haul Trucks	0	0	0
Offsite Worker Travel	5.06E-03	5.06E-03	5.06E-03

TABLE C-6-20 (CONT.)

Decommissioning of the MGS Units 1 and 2 – Winter (Peak) Daily Emissions

Project Month	**1**	**2**	**3**
	PM10 (lbs/day)		
Onsite Off-Road Equipment	0.06	0.06	0.06
Onsite Vehicle	2.92E-06	2.92E-06	2.92E-06
Onsite Off-Road + Onsite Vehicle	0.06	0.06	0.06
Offsite Delivery and Haul Trucks	0	0	0
Offsite Worker Travel	2.92E-03	2.92E-03	2.92E-03
	PM2.5 (lbs/day)		
Onsite Off-Road Equipment	0.06	0.06	0.06
Onsite Vehicle	2.71E-06	2.71E-06	2.71E-06
Onsite Off-Road + Onsite Vehicle	0.06	0.06	0.06
Offsite Delivery and Haul Trucks	0	0	0
Offsite Worker Travel	2.71E-03	2.71E-03	2.71E-03
	CO2 (lbs/day)		
Onsite Off-Road Equipment	3,638	3,638	3,638
Onsite Vehicle	0.36	0.36	0.36
Onsite Off-Road + Onsite Vehicle	3,638	3,638	3637.93
Offsite Delivery and Haul Trucks	0	0	0
Offsite Worker Travel	363	363	363
	CH4 (lbs/day)		
Onsite Off-Road Equipment	1.18	1.18	1.18
Onsite Vehicle	1.60E-05	1.60E-05	1.60E-05
Onsite Off-Road + Onsite Vehicle	1.18	1.18	1.18
Offsite Delivery and Haul Trucks	0	0	0
Offsite Worker Travel	0.02	0.02	0.02
	N2O (lbs/day)		
Onsite Off-Road Equipment	0	0	0
Onsite Vehicle	0	0	0
Onsite Off-Road + Onsite Vehicle	0	0	0
Offsite Delivery and Haul Trucks	0	0	0
Offsite Worker Travel	0	0	0
	CO2e (lbs/day)		
Onsite Off-Road Equipment	3,662	3,662	3,662
Onsite Vehicle	0.36	0.36	0.36
Onsite Off-Road + Onsite Vehicle	3,663	3,663	3662.63
Offsite Delivery and Haul Trucks	0	0	0
Offsite Worker Travel	363	363	363

TABLE C-6-21
Decommissioning of the MGS Units 1 and 2 – CalEEMod Input Data

Project Name	Puente Power Project	
District	Ventura County	
Wind Speed	2.6	m/s
Precipitation Frequency	31	days/year
Climate Zone	8	
Urbanization Level	Rural	
Expected Operational Year	2021	
Utility Company	Southern California Edison	
CO2 Intensity Factor	630.89	
CH4 Intensity Factor	0.029	
N2O Intensity Factor	0.006	

CalEEMod Phase Name	Phase Type	Start Date	End Date	# day/Week	Number of Days	Month
Decommissioning 1	Grading	4/1/2020	4/30/2020	6	26	1
Decommissioning 2	Grading	5/1/2020	5/31/2020	6	27	2
Decommissioning 3	Grading	6/1/2020	6/30/2020	6	25	3

TABLE C-6-22
Decommissioning of the MGS Units 1 and 2 – CalEEMod Equipment Schedule Input

				2020			
	Fuel Type	**CalEEMod Equip Type**	**HP**	**APR**	**MAY**	**JUN**	
Project Month				**1**	**2**	**3**	**Total**
Pickup truck	Gas	Off-Highway Trucks	150	1	1	1	3
1-ton flatbed truck	Gas	Off-Highway Trucks	150				0
Tractor	Diesel	Off-Highway Tractors	200				0
Forklift	Gas	Forklifts	40	1	1	1	3
Fuel/lube truck	Gas	Off-Highway Trucks	150				0
M2250 ringer /2250 crawler crane	Diesel	Cranes	500				0
150-ton crawler	Diesel	Crawler Tractors	300				0
Hydraulic crane (55-ton)	Diesel	Cranes	300				0
Hydraulic crane (45-ton)	Diesel	Cranes	250				0
Articulating boom manlift (120, 80, 60, and 40)	Gas	Aerial Lifts	75				0
Air compressor	Gas	Air Compressors	50				0
Backhoe loader	Diesel	Tractors/Loaders/Backhoes	80				0
Front-end loader	Diesel	Rubber Tired Loaders	130				0
Dump truck (30-ton)	Diesel	Off-Highway Trucks	300				0
Hydraulic excavator	Diesel	Excavators	250				0
Bulldozer	Diesel	Rubber Tired Dozers	300				0
Bulldozer w/ripper	Diesel	Rubber Tired Dozers	300				0
Vibratory roller	Gas	Rollers	125				0
Walk behind vibratory roller	Gas	Other Construction Equipment	25				0
Motor grader	Diesel	Graders	200				0
Jumping jack compactors	Gas	Plate Compactors	7.5				0
Water truck	Diesel	Off-Highway Trucks	300				0
Concrete pumper truck	Diesel	Off-Highway Trucks	350				0
Concrete mixer truck	Diesel	Off-Highway Trucks	250				0
Welding machine (diesel)	Diesel	Welders	25				0
Light plant	Gas	Other Construction Equipment	25				0
Tanker Truck	Diesel	Off-Highway Trucks	250	3	3	3	9
TOTAL (ALL)				**5**	**5**	**5**	15

TABLE C-6-23
Decommissioning of the MGS Units 1 and 2 – CalEEMod Vehicle Trips Input

	2020		
	APR	**MAY**	**JUN**
Project Month	**1**	**2**	**3**
Craft/Trade			
Boilermakers			
Carpenters			
Electricians	2	2	2
Ironworkers			
Laborers	3	3	3
Pipe Fitters			
Painters and Insulators			
Cement Finisher			
Millwrights	2	2	2
Operators	1	1	1
Teamsters			
Number of Craft Labor (Subtotal)	**8**	**8**	**8**
Staff	2	2	2
Number of Decommissioning Staff (Subtotal)	**2**	**2**	**2**
Worker Trips (trips/day)	**10**	**10**	**10**
Worker Trips Length (miles)	60	60	60
Worker Trips, Percent Paved (%)	100%	100%	100%
Truck Delivery and Hauling Trucks (Average per month)			
Project total			
Equipment Delivery and Haul Trucks Trips per month	**0**	**0**	**0**
Delivery Truck Trips Length (miles)	60.0	60.0	60.0
Delivery Truck Trips, Percent Paved (%)	100%	100%	100%

Note:
Worker trips and truck trips length are assumed to be from the LA County line to the project site using HW 101 (a one-way trip of 30 miles, roundtrip 60 miles)

APPENDIX C-7

VCAPCD PUBLIC INFORMATION REQUEST

sierra
research

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Sacramento, CA 95811
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January 16, 2015

Maree Penhart
Ventura County APCD
669 County Square Drive, 2nd Floor
Ventura, CA 93003

Dear Ms. Penhart:

This is a public records request for specific information needed to perform a cumulative air quality impact analysis. The proposed project is the Mandalay Energy Center, which will be located on the property of the existing Mandalay Generating Station located at 393 North Harbor Blvd., Oxnard, CA. The proposed project would be located at 34 degrees 12 minutes 24 seconds north latitude and 119 degrees 15 minutes 03 seconds west longitude, equivalent to stack Universal Transverse Mercator (UTM) coordinates of 3787361 meters northing, 292625 meters easting in Zone 11 of North American Datum 1983 (NAD 83).

Specifically, we request the information listed below for facilities located within a six-mile radius of the project site.

- A list of all new Authorities to Construct and/or modified Permits to Operate issued after June 1, 2013 for projects that result in a net emissions increase of 5 tons per year or more of NOx, PM_{10}, SOx, or CO.

- A list of projects for which Authority to Construct permits have not been issued to date but that are reasonably foreseeable and are expected to result in a net emissions increase of 5 tons per year or more of NOx, PM_{10}, SOx, or CO.

- For each new/modified source identified above, please provide the following information, to the extent available:

    - Facility name;
    - Facility location;
    - Type of new/modified basic emitting equipment; and
    - Net emission increases for all criteria pollutants.

- For each new/modified source identified above, also please provide the following facility information for each stack:

    - Height;
    - Inside diameter;

- Exit temperature;
- Exhaust flow rate or velocity;
- Base elevation; and
- UTM coordinates.

If you have any questions regarding this request, please do not hesitate to call me at (916) 444-6666.

Sincerely,

Tom Andrews
Principal Engineer

Enclosure

Ventura County
Air Pollution
Control District

Public Records Request Form

Please fill out this form as completely as possible. Please fill out a separate form for each address of interest. The form may be faxed to the District at 805/645-1444. If you have any questions, please contact Maree Penhart at 805/645-1403.

Person Requesting Information

Name: Tom Andrews	Date: January 16, 2015
Company: Sierra Research	
Mailing Address: 1801 J Street	
City: Sacramento	State: CA Zip Code: 95811
Telephone Number: (916) 444-6666	Fax Number: (916) 444-8373
Email address: tandrews@sierraresearch.com	

Standard Facility Information Request

Facility Name: Vicinity of Mandalay Generating Station	
Facility Address: 393 North Harbor Blvd	
City: Oxnard	State: CA Zip Code: 93035
Facility Number(s):	

Information Requested (Check All That Are Applicable):

☐ Copy of Current Facility Permit to Operate with Facility Permitted Emissions
☐ Inspection Summary (1996 to Present)
☐ Notice of Violation Summary (1996 to Present)
☐ Notice to Comply Summary (1996 to Present)
☐ Complaint Summary (1996 to Present)
☒ Other (Describe Below)

See attached letter for explanation of information requested.

Requests for records must be for clearly identifiable records in the District's possession, and for facilities within the District's jurisdiction. The District is not required by law to create a new record or list from an already existing record.

Copying costs are $0.17 per page for requests that are 10 pages or more in length. If the "Other" box is checked, an additional charge for labor may be added to the invoice for the information requested.

NOW AVAILABLE ONLINE!
Facility Info System
Find information on facilities with APCD Permits at:
http://www.vcapcd.org/FIS.htm

Ventura County
Air Pollution
Control District

669 County Square Drive
Ventura, California 93003

tel 805/645-1400
fax 805/645-1444
www.vcapcd.org

Michael Villegas
Air Pollution Control Officer

February 17, 2015

Mr. Tom Andrews
Sierra Research
1801 "J" Street
Sacramento, CA 95811

Subject: Public Records Request of January 16, 2015 - Mandalay Energy Center

Dear Mr. Andrews:

This letter is in response to your letter of January 16, 2015 that requested designated public records of permitting actions located near the proposed Mandalay Energy Center at 393 Harbor Boulevard in Oxnard, CA. The information below details the results of your request. As we recently discussed by telephone, the Ventura County APCD does not have the exhaust stack information that you requested, but has provided the approximate location coordinates of the new equipment. Enclosed please find an invoice for the labor required to fulfill this public record request.

There are no new Authorities to Construct issued after June 1, 2013 that meet the net emissions increase criteria in your request. The few Authorities to Construct that do meet the net emissions increase criteria have already been implemented into Permits to Operate. As we discussed, you are only interested in Authorities to Construct where the equipment has not yet been installed and is not currently operating.

There are two projects detailed below where Authority to Construct permits have not yet been issued that meet the net emissions increase criteria in your request. Both of these permitting actions are for hospital expansion projects in the City of Ventura. The Ventura County APCD expects to issue these Authorities to Construct in the next several months.

<u>Authority to Construct No. 00123-140</u>
Community Memorial Hospital
147 N. Brent Street
Ventura, CA 93003

Approximate new equipment location in decimal degrees = 34.273877, -119.258083

Three (3) new 7.0 MMBTU/Hr Boilers and three (3) new 5.0 MMBTU/Hr Boilers, fired exclusively on natural gas:

Tons per year emissions increase:

ROC	NOx	PM	SOx	CO
0.38	0.79	0.52	0.04	21.29

Two (2) new 2220 BHP emergency diesel engines:

Tons per year emissions increase:

ROC	NOx	PM	SOx	CO
0.05	0.98	0.01	0.05	0.22

Authority to Construct No. 00143-150
Ventura County Medical Center
3291 Loma Vista Road
Ventura, CA 93003

Approximate new equipment location in decimal degrees = 34.277468, -119.253191

Three (3) new 20.41 MMBTU/Hr Boilers, fired on natural gas, with Amber 363 fuel oil as backup fuel in case of natural gas curtailment:

Tons per year emissions increase:

ROC	NOx	PM	SOx	CO
0.95	1.76	1.36	0.11	13.44

One (1) new 2206 BHP emergency diesel engine:

Tons per year emissions increase:

ROC	NOx	PM	SOx	CO
0.01	0.46	<0.01	0.02	0.02

If you have any questions, or wish to discuss this matter in further detail, please contact me at 805/645-1421.

Sincerely,

Kerby E. Zozula, Manager
Engineering Division

Enclosures

APPENDIX C-8

NON-CRITERIA POLLUTANT EMISSION CALCULATIONS

Table C-8.1
Puente Power Project
Non-Criteria Pollutant Emission Calculations New Gas Turbine (Hourly Emissions

Pollutant	Uncontrolled Emission Factor (lbs/MMBtu)	Basis	Normal Oper. Controlled Emission Factor (lbs/MMBtu)	Worst Case Startup/Shutdown VOC Emiss. Vs. Normal Operation VOC Emiss.(4) (lbs/hr)/(lbs/hr)	Startup/Shutdown Emission Factor(4) (lbs/MMBtu)	Commissioning Emission Factor(5) (lbs/MMBtu)	New GT Max. Firing Rate (MMBtu/hr)	New GT Normal Oper. Emissions (lbs/hr)	New GT Startup/Shutdown Emissions (lbs/hr)	New GT Commissioning Emissions (lbs/hr)
Ammonia	6.66E-03	Permit Limit(3)	6.66E-03	8.01	6.66E-03	6.66E-03	2,579	1.72E+01	1.72E+01	1.72E+01
Propylene	7.56E-04	0.5*CATEF(2)	3.78E-04	8.01	3.03E-03	7.56E-04	2,579	9.75E-01	7.81E+00	1.95E+00
Hazardous Air Pollutants (HAPs) - Federal										
Acetaldehyde	4.00E-05	0.5*AP-42(1)	2.00E-05	8.01	1.60E-04	4.00E-05	2,579	5.16E-02	4.13E-01	1.03E-01
Acrolein	6.42E-06	0.5*AP-42(1)	3.21E-06	8.01	2.57E-05	6.42E-06	2,579	8.28E-03	6.63E-02	1.66E-02
Benzene	1.20E-05	0.5*AP-42(1)	5.99E-06	8.01	4.80E-05	1.20E-05	2,579	1.54E-02	1.24E-01	3.09E-02
1,3-Butadiene	4.30E-07	0.5*AP-42(1)	2.15E-07	8.01	1.72E-06	4.30E-07	2,579	5.55E-04	4.44E-03	1.11E-03
Ethylbenzene	3.20E-05	0.5*AP-42(1)	1.60E-05	8.01	1.28E-04	3.20E-05	2,579	4.13E-02	3.31E-01	8.25E-02
Formaldehyde	9.00E-04	0.5*CATEF(2)	4.50E-04	8.01	3.60E-03	9.00E-04	2,579	1.16E+00	9.30E+00	2.32E+00
Hexane, n-	2.54E-04	0.5*CATEF(2)	1.27E-04	8.01	1.02E-03	2.54E-04	2,579	3.28E-01	2.62E+00	6.55E-01
Naphthalene	1.31E-06	0.5*AP-42(1)	6.53E-07	8.01	5.23E-06	1.31E-06	2,579	1.68E-03	1.35E-02	3.37E-03
Total PAHs (listed individually below)	6.43E-07	SUM	3.22E-07	8.01	2.58E-06	6.43E-07	2,579	8.30E-04	6.65E-03	1.66E-03
Acenaphthene	1.86E-08	0.5*CATEF(2)	9.32E-09	8.01	7.47E-08	1.86E-08	2,579	2.40E-05	1.93E-04	4.81E-05
Acenapthyene	1.44E-08	0.5*CATEF(2)	7.21E-09	8.01	5.78E-08	1.44E-08	2,579	1.86E-05	1.49E-04	3.72E-05
Anthracene	3.32E-08	0.5*CATEF(2)	1.66E-08	8.01	1.33E-07	3.32E-08	2,579	4.28E-05	3.43E-04	8.56E-05
Benzo(a)anthracene	2.22E-08	0.5*CATEF(2)	1.11E-08	8.01	8.89E-08	2.22E-08	2,579	2.86E-05	2.29E-04	5.73E-05
Benzo(a)pyrene	1.36E-08	0.5*CATEF(2)	6.82E-09	8.01	5.46E-08	1.36E-08	2,579	1.76E-05	1.41E-04	3.52E-05
Benzo(e)pyrene	5.34E-10	0.5*CATEF(2)	2.67E-10	8.01	2.14E-09	5.34E-10	2,579	6.89E-07	5.52E-06	1.38E-06
Benzo(b)fluoranthrene	1.11E-08	0.5*CATEF(2)	5.54E-09	8.01	4.44E-08	1.11E-08	2,579	1.43E-05	1.14E-04	2.86E-05
Benzo(k)fluoranthrene	1.08E-08	0.5*CATEF(2)	5.40E-09	8.01	4.33E-08	1.08E-08	2,579	1.39E-05	1.12E-04	2.79E-05
Benzo(g,h,i)perylene	1.34E-08	0.5*CATEF(2)	6.72E-09	8.01	5.38E-08	1.34E-08	2,579	1.73E-05	1.39E-04	3.47E-05
Chrysene	2.48E-08	0.5*CATEF(2)	1.24E-08	8.01	9.93E-08	2.48E-08	2,579	3.20E-05	2.56E-04	6.40E-05
Dibenz(a,h)anthracene	2.30E-08	0.5*CATEF(2)	1.15E-08	8.01	9.21E-08	2.30E-08	2,579	2.97E-05	2.38E-04	5.93E-05
Fluoranthene	4.24E-08	0.5*CATEF(2)	2.12E-08	8.01	1.70E-07	4.24E-08	2,579	5.47E-05	4.38E-04	1.09E-04
Fluorene	5.70E-08	0.5*CATEF(2)	2.85E-08	8.01	2.28E-07	5.70E-08	2,579	7.35E-05	5.89E-04	1.47E-04
Indeno(1,2,3-cd)pyrene	2.30E-08	0.5*CATEF(2)	1.15E-08	8.01	9.21E-08	2.30E-08	2,579	2.97E-05	2.38E-04	5.93E-05
Phenanthrene	3.08E-07	0.5*CATEF(2)	1.54E-07	8.01	1.23E-06	3.08E-07	2,579	3.97E-04	3.18E-03	7.94E-04
Pyrene	2.72E-08	0.5*CATEF(2)	1.36E-08	8.01	1.09E-07	2.72E-08	2,579	3.51E-05	2.81E-04	7.02E-05
Propylene oxide	2.90E-05	0.5*AP-42(1)	1.45E-05	8.01	1.16E-04	2.90E-05	2,579	3.74E-02	3.00E-01	7.48E-02
Toluene	1.31E-04	0.5*AP-42(1)	6.53E-05	8.01	5.23E-04	1.31E-04	2,579	1.68E-01	1.35E+00	3.37E-01
Xylene	6.40E-05	0.5*AP-42(1)	3.20E-05	8.01	2.56E-04	6.40E-05	2,579	8.25E-02	6.61E-01	1.65E-01

Notes:
(1) AP-42, Table 3.1-3, 4/00.
(2) From CARB CATEF database (converted from lbs/MMscf to lbs/MMBtu based on site natural gas HHV).
(3) Based on 5 ppm ammonia slip from SCR system.
(4) Controlled emission factor adjusted upward based on VOC emission ratio - as required by SDAPCD for the Pio Pico Energy Center and the Amended Carlsbad Energy Center Project.
(5) Based on uncontrolled emission factors - as required by SDAPCD for the Pio Pico Energy Center and the Amended Carlsbad Energy Center Project.

Table C-8.2
Puente Power Project
Non-Criteria Pollutant Emissions New Gas Turbine (Annual Emissions)

Pollutant	New Gas Turbine Normal Operating Hours (hrs/yr)	New Gas Turbine Startup/Shutdown Hours (hrs/yr)	New Gas Turbine Commissioning Hours (hrs/yr)	New Gas Turbine(1) Annual Emissions (tons/yr)	New Gas Turbine Annual Commissioning Emissions (tons/yr)
Ammonia	2,053	400	366	21.06	3.14
Propylene	2,053	400	366	2.56	0.36
Hazardous Air Pollutants (HAPs) - Federal					
Acetaldehyde	2,053	400	366	0.136	0.019
Acrolein	2,053	400	366	0.022	0.003
Benzene	2,053	400	366	0.041	0.006
1,3-Butadiene	2,053	400	366	0.001	0.000
Ethylbenzene	2,053	400	366	0.108	0.015
Formaldehyde	2,053	400	366	3.051	0.425
Hexane, n-	2,053	400	366	0.861	0.120
Naphthalene	2,053	400	366	0.004	0.001
Total PAHs (listed individually below)	2,053	400	366	0.002	0.000
Acenaphthene	2,053	400	366	0.000	0.000
Acenapthyene	2,053	400	366	0.000	0.000
Anthracene	2,053	400	366	0.000	0.000
Benzo(a)anthracene	2,053	400	366	0.000	0.000
Benzo(a)pyrene	2,053	400	366	0.000	0.000
Benzo(e)pyrene	2,053	400	366	0.000	0.000
Benzo(b)fluoranthrene	2,053	400	366	0.000	0.000
Benzo(k)fluoranthrene	2,053	400	366	0.000	0.000
Benzo(g,h,i)perylene	2,053	400	366	0.000	0.000
Chrysene	2,053	400	366	0.000	0.000
Dibenz(a,h)anthracene	2,053	400	366	0.000	0.000
Fluoranthene	2,053	400	366	0.000	0.000
Fluorene	2,053	400	366	0.000	0.000
Indeno(1,2,3-cd)pyrene	2,053	400	366	0.000	0.000
Phenanthrene	2,053	400	366	0.001	0.000
Pyrene	2,053	400	366	0.000	0.000
Propylene oxide	2,053	400	366	0.098	0.014
Toluene	2,053	400	366	0.443	0.062
Xylene	2,053	400	366	0.217	0.030
Total (HAPs) =				4.98	0.69
Total (All) =				28.61	4.19

Notes:
(1) Includes startup/shutdown emissions.

Table C-8.3
Puente Power Project
Non-Criteria Pollutant Emission Calculations Emergency Engine

Pollutant	Emission Factor (lbs/Mgal)	Basis	New Generator Fuel Use (gals/hr)	New Generator Fuel Use (gals/year)	Generator Hourly Emissions (lbs/hr)	Generator Annual Emissions (tons/yr)
Diesel PM (Not a HAPS)	N/A	N/A	35.9	7,180	3.84E-02	3.84E-03
Acrolein	1.07E-03	CATEF	35.9	7,180	3.84E-05	3.8413E-06

Pollutant	New Generator Acute Modeling Hourly Emission Rate (g/sec)	New Generator Chronic/Cancer Risk Modeling Annual Emission Rate (g/sec)
Diesel PM (Not a HAPS)	N/A	1.11E-04
Acrolein	4.84E-06	N/A

Table C-8.4
Puente Power Project
Non-Criteria Pollutant Emission Factors
MGS Existing Units 1 - 3

Pollutant	Boiler Emission Factors(1) lb/MMscf	Unit 3 GT Emission Factors(2) lb/MMscf	Unit 1 Max Firing Rate MMBtu/hr	Unit 2 Max Firing Rate MMBtu/hr	Unit 3 GT Max Firing Rate MMBtu/hr
Ammonia (not a HAP)	4.79E+00	0.00E+00	1900	1900	2510
Propylene (Not a HAP)	1.55E-02	7.72E-01	1900	1900	2510
Propylene oxide		2.96E-02	1900	1900	2510
Benzene	1.70E-03	1.22E-02	1900	1900	2510
Formaldehyde	3.60E-03	9.19E-01	1900	1900	2510
Hexane	1.30E-03	2.59E-01	1900	1900	2510
Naphthalene	3.00E-04	1.33E-03	1900	1900	2510
Dichlorobenzene			1900	1900	2510
Toluene	7.80E-03	1.33E-01	1900	1900	2510
1,3-Butadiene		4.39E-04	1900	1900	2510
Acetaldehyde	9.00E-04	4.09E-02	1900	1900	2510
Acrolein	8.00E-04	6.56E-03	1900	1900	2510
Ethyl Benzene	2.00E-03	3.27E-02	1900	1900	2510
PAHs (other)	1.00E-04	6.57E-04	1900	1900	2510
Xylene	5.80E-03	6.54E-02	1900	1900	2510

Notes:
(1) All boiler factors except ammonia from Ventura County APCD AB2588 emission factors for natural gas external combustion (greater than 100 MMBtu/hr), May 17, 2001.
Ammonia based on Title V permit NH3 hourly emission limit.
(2) A combination of AP-42 (Table 3.1-3, 4/00) and CARB CATEF database emission factors.

Table C-8.5
Puente Power Project
Non-Criteria Pollutant Hourly Emissions
MGS Existing Units 1 - 3

Pollutant	Unit 1 Emissions lb/hr	Unit 2 Emissions lb/hr	Unit 3 GT Emissions lb/hr
Ammonia (not a HAP)	8.91E+00	8.91E+00	0.00E+00
Propylene (Not a HAP)	2.89E-02	2.89E-02	1.90E+00
Propylene oxide	0.00E+00	0.00E+00	7.28E-02
Benzene	3.16E-03	3.16E-03	3.01E-02
Formaldehyde	6.70E-03	6.70E-03	2.26E+00
Hexane	2.42E-03	2.42E-03	6.38E-01
Naphthalene	5.58E-04	5.58E-04	3.28E-03
Dichlorobenzene	0.00E+00	0.00E+00	0.00E+00
Toluene	1.45E-02	1.45E-02	3.28E-01
1,3-Butadiene	0.00E+00	0.00E+00	1.08E-03
Acetaldehyde	1.67E-03	1.67E-03	1.00E-01
Acrolein	1.49E-03	1.49E-03	1.61E-02
Ethyl Benzene	3.72E-03	3.72E-03	8.03E-02
PAHs (other)	1.86E-04	1.86E-04	1.61E-03
Xylene	1.08E-02	1.08E-02	1.61E-01

Table C-8.6
Puente Power Project
Non-Criteria Pollutant Annual Emissions (maximum 2-year avg. over past 5-years)
MGS Existing Units 1 - 3

Pollutant	Unit 1 Annual Avg Firing Rate MMscf/yr	Unit 2 Annual Avg Firing Rate MMscf/yr	Unit 3 GT Annual Avg Firing Rate MMscf/yr	Unit 1 Annual Emissions tons/yr	Unit 2 Annual Emissions tons/yr	Unit 3 GT Annual Emissions tons/yr	Subtotal tons/yr
Ammonia (not a HAP)	1,102	1,297	89	2.639	3.107	0.000	5.746
Propylene (Not a HAP)	1,102	1,297	89	0.009	0.010	0.034	0.053
Propylene oxide	1,102	1,297	89	0.000	0.000	0.001	0.001
Benzene	1,102	1,297	89	0.001	0.001	0.001	0.003
Formaldehyde	1,102	1,297	89	0.002	0.002	0.041	0.045
Hexane	1,102	1,297	89	0.001	0.001	0.011	0.013
Naphthalene	1,102	1,297	89	0.000	0.000	0.000	0.000
Dichlorobenzene	1,102	1,297	89	0.000	0.000	0.000	0.000
Toluene	1,102	1,297	89	0.004	0.005	0.006	0.015
1,3-Butadiene	1,102	1,297	89	0.000	0.000	0.000	0.000
Acetaldehyde	1,102	1,297	89	0.000	0.001	0.002	0.003
Acrolein	1,102	1,297	89	0.000	0.001	0.000	0.001
Ethyl Benzene	1,102	1,297	89	0.001	0.001	0.001	0.004
PAHs (other)	1,102	1,297	89	0.000	0.000	0.000	0.000
Xylene	1,102	1,297	89	0.003	0.004	0.003	0.010
						Total (HAPs) =	0.096
						Total (All) =	5.894

Table C-8.7
Puente Power Project
Non-Criteria Pollutant Emissions New Gas Turbine (Modeling Inputs)

Pollutant	For Acute Modeling Hourly Normal Oper. Emission Rate (g/sec)	For Acute Modeling Hourly Startup/Shutdown Emission Rate (g/sec)	For Acute Modeling Hourly Commissioning Emission Rate (g/sec)	For Chronic/Cancer Risk Modeling Annual Normal Oper. Emission Rate(1) (g/sec)	For Chronic/Cancer Risk Modeling Annual Commissioning Emission Rate(1) (g/sec)
Ammonia	2.16E+00	2.16E+00	2.16E+00	6.06E-01	9.04E-02
Propylene	1.23E-01	9.84E-01	2.46E-01	7.37E-02	1.03E-02
Hazardous Air Pollutants (HAPs) - Federal					
Acetaldehyde	6.50E-03	5.21E-02	1.30E-02	3.90E-03	5.43E-04
Acrolein	1.04E-03	8.36E-03	2.09E-03	6.26E-04	8.72E-05
Benzene	1.95E-03	1.56E-02	3.89E-03	1.17E-03	1.63E-04
1,3-Butadiene	6.99E-05	5.60E-04	1.40E-04	4.19E-05	5.84E-06
Ethylbenzene	5.20E-03	4.17E-02	1.04E-02	3.12E-03	4.34E-04
Formaldehyde	1.46E-01	1.17E+00	2.92E-01	8.78E-02	1.22E-02
Hexane, n-	4.13E-02	3.31E-01	8.25E-02	2.48E-02	3.45E-03
Naphthalene	2.12E-04	1.70E-03	4.24E-04	1.27E-04	1.77E-05
Total PAHs (listed individually below)	1.05E-04	8.37E-04	2.09E-04	6.27E-05	8.74E-06
Acenaphthene	3.03E-06	2.43E-05	6.06E-06	1.82E-06	2.53E-07
Acenapthyene	2.34E-06	1.88E-05	4.69E-06	1.41E-06	1.96E-07
Anthracene	5.39E-06	4.32E-05	1.08E-05	3.24E-06	4.51E-07
Benzo(a)anthracene	3.61E-06	2.89E-05	7.21E-06	2.16E-06	3.01E-07
Benzo(a)pyrene	2.22E-06	1.78E-05	4.43E-06	1.33E-06	1.85E-07
Benzo(e)pyrene	8.68E-08	6.95E-07	1.74E-07	5.21E-08	7.25E-09
Benzo(b)fluoranthrene	1.80E-06	1.44E-05	3.60E-06	1.08E-06	1.50E-07
Benzo(k)fluoranthrene	1.75E-06	1.41E-05	3.51E-06	1.05E-06	1.47E-07
Benzo(g,h,i)perylene	2.18E-06	1.75E-05	4.37E-06	1.31E-06	1.82E-07
Chrysene	4.03E-06	3.23E-05	8.06E-06	2.42E-06	3.37E-07
Dibenz(a,h)anthracene	3.74E-06	2.99E-05	7.47E-06	2.24E-06	3.12E-07
Fluoranthene	6.89E-06	5.52E-05	1.38E-05	4.13E-06	5.76E-07
Fluorene	9.26E-06	7.42E-05	1.85E-05	5.56E-06	7.74E-07
Indeno(1,2,3-cd)pyrene	3.74E-06	2.99E-05	7.47E-06	2.24E-06	3.12E-07
Phenanthrene	5.00E-05	4.01E-04	1.00E-04	3.00E-05	4.18E-06
Pyrene	4.42E-06	3.54E-05	8.84E-06	2.65E-06	3.69E-07
Propylene oxide	4.71E-03	3.77E-02	9.42E-03	2.83E-03	3.94E-04
Toluene	2.12E-02	1.70E-01	4.24E-02	1.27E-02	1.77E-03
Xylene	1.04E-02	8.33E-02	2.08E-02	6.24E-03	8.69E-04

Notes:
(1) Includes startup/shutdown emissions.

Table C-8.8
Puente Power Project
Non-Criteria Pollutant Modeling Inputs
MGS Existing Units 1 - 3

Pollutant	Unit 1 Hourly Emiss. (g/sec)	Unit 2 Hourly Emiss. (g/sec)	Unit 3 GT Hourly Emiss. (g/sec)	Unit 1 Annual Emiss (g/sec)	Unit 2 Annual Emiss (g/sec)	Unit 3 GT Annual Emiss. (g/sec)
Ammonia (not a HAP)	1.12E+00	1.12E+00	0.00E+00	7.59E-02	8.94E-02	0.00E+00
Propylene (Not a HAP)	3.64E-03	3.64E-03	2.39E-01	2.46E-04	2.90E-04	9.84E-04
Propylene oxide	0.00E+00	0.00E+00	9.17E-03	0.00E+00	0.00E+00	3.77E-05
Benzene	3.98E-04	3.98E-04	3.79E-03	2.69E-05	3.17E-05	1.56E-05
Formaldehyde	8.44E-04	8.44E-04	2.85E-01	5.70E-05	6.72E-05	1.17E-03
Hexane	3.05E-04	3.05E-04	8.03E-02	2.06E-05	2.43E-05	3.30E-04
Naphthalene	7.03E-05	7.03E-05	4.13E-04	4.75E-06	5.60E-06	1.70E-06
Dichlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	1.83E-03	1.83E-03	4.13E-02	1.24E-04	1.46E-04	1.70E-04
1,3-Butadiene	0.00E+00	0.00E+00	1.36E-04	0.00E+00	0.00E+00	5.59E-07
Acetaldehyde	2.11E-04	2.11E-04	1.27E-02	1.43E-05	1.68E-05	5.20E-05
Acrolein	1.87E-04	1.87E-04	2.03E-03	1.27E-05	1.49E-05	8.35E-06
Ethyl Benzene	4.69E-04	4.69E-04	1.01E-02	3.17E-05	3.73E-05	4.16E-05
PAHs (other)	2.34E-05	2.34E-05	2.03E-04	1.58E-06	1.87E-06	8.37E-07
Xylene	1.36E-03	1.36E-03	2.02E-02	9.19E-05	1.08E-04	8.33E-05