

US EPA ARCHIVE DOCUMENT

Table 6-14
Pioneer Valley Energy Center
Refined Modeling - Individual Source Contributions and Cumulative Impacts¹

Source		Turbine Gas	Turbine Gas	Turbine ULSD	Turbine ULSD	Turbine ULSD	Aux Boiler	Egen	Firepump	Cooling Tower		
Load (%)		100	100	100	75	60	100	100	100			
Amb Temp (F)		10	59	59	59	59						
Hours/Day		24	24	24	24	24	24	24	24	24		
Hours/Year		8760	8760	1440	1440	1440	1100	300	300	8760		
Maximum Emission Rates (g/sec)												
NOx		2.5452	2.2680	5.3802	4.2966	3.7548	0.0769	4.7212	0.4045	0.0000		
CO		1.5498	1.3860	3.9312	3.1374	2.7468	0.0983	1.5372	0.0315	0.0000		
SO2		0.5922	0.5292	0.4284	0.3402	0.3024	0.0014	0.0101	0.0009	0.0000		
PM10		1.2348	1.1088	3.1248	2.4822	2.1420	0.0126	0.1147	0.0107	0.0013		
PM2.5		1.2348	1.1088	3.1248	2.4822	2.1420	0.0126	0.1147	0.0107	0.0013		
AERMOD Results @ 1 g/sec Emission Rate												
1-hr	2006	5.6544	6.3755	6.0795	6.6287	7.9461	75.5461	35.7183	463.4218	330.6454		
	2007	6.7824	7.6571	5.3481	7.6137	8.9041	78.5258	33.1585	462.5684	278.2042		
	2008	5.6472	6.3214	4.8417	6.3955	7.3161	98.1741	32.9742	487.8913	325.3388		
	2009	6.6492	7.4258	5.2985	7.5936	8.5978	77.0945	34.3816	471.4220	353.0611		
	2010	7.1163	7.8294	5.6367	7.8783	8.9732	79.9013	34.1644	407.3652	314.8464		
	Max	7.1163	7.8294	6.0795	7.8783	8.9732	98.1741	35.7183	487.8913	353.0611		
3-hr	2006	1.8915	2.1324	2.0294	2.2109	2.7373	65.8118	25.5225	398.8812	238.9191		
	2007	2.2624	2.5541	1.7890	2.5396	2.9698	67.1723	26.3176	380.4869	185.3703		
	2008	1.8845	2.1094	1.6183	2.1341	2.4410	66.8973	26.4352	368.1787	298.4053		
	2009	2.4308	2.4755	2.4524	2.5314	2.8688	63.3318	28.0376	313.4391	299.5127		
	2010	2.4914	2.6599	2.1377	2.6288	2.9970	67.0386	29.8831	304.9583	251.6865		
	Max	2.4914	2.6599	2.4524	2.6288	2.9970	67.1723	29.8831	398.8812	299.5127		
8-hr	2006	0.8071	0.9110	0.7629	0.9609	1.2314	62.6309	18.2601	314.8186	238.0702		
	2007	1.0498	1.0960	0.9192	1.0900	1.2743	62.0636	19.1146	304.3302	133.5034		
	2008	0.9002	0.9631	0.8284	0.9656	1.1119	60.7197	19.0803	249.3920	223.6779		
	2009	1.1854	1.3476	0.9403	1.3973	1.7102	53.9253	20.9735	216.5833	188.2885		
	2010	1.0466	1.1154	0.9243	1.1315	1.4096	55.6261	19.8832	250.1835	213.9839		
	Max	1.1854	1.3476	0.9403	1.3973	1.7102	62.6309	20.9735	314.8186	238.0702		
24-hr	2006	0.3172	0.3680	0.2923	0.4314	0.5357	56.0298	14.1040	220.4411	98.3200		
	2007	0.4129	0.4281	0.3627	0.4933	0.5602	49.3141	12.4834	238.6305	71.7438		
	2008	0.3910	0.4200	0.3724	0.4759	0.5839	56.3972	16.3934	171.9925	113.4078		
	2009	0.5021	0.5466	0.4089	0.5573	0.7110	47.3624	13.9837	137.5050	137.3268		
	2010	0.5260	0.5556	0.4483	0.6360	0.8294	39.6801	15.0836	196.9072	101.8237		
	Max	0.5260	0.5556	0.4483	0.6360	0.8294	56.3972	16.3934	238.6305	137.3268		
Annual	2006	0.0198	0.0233	0.0171	0.0266	0.0379	10.1839	1.8469	15.8743	4.1772		
	2007	0.0217	0.0254	0.0188	0.0293	0.0407	9.4861	1.8148	17.5526	4.3009		
	2008	0.0184	0.0197	0.0186	0.0215	0.0295	8.7805	1.5585	15.7086	4.2344		
	2009	0.0391	0.0422	0.0343	0.0430	0.0491	6.5109	2.0896	19.5343	4.9737		
	2010	0.0350	0.0383	0.0315	0.0390	0.0518	5.2944	2.1754	18.0504	6.1205		
	Max	0.0391	0.0422	0.0343	0.0430	0.0518	10.1839	2.1754	19.5343	6.1205		
AERMOD Results @ Maximum Emission Rates												
NOx	1-hr	18.11	17.76	32.71	33.85	33.69	7.55	168.63	197.33	0.00	407.36	
NOx	Annual	0.100	0.096	0.030	0.030	0.032	0.098	0.352	0.271	0.000	0.85	
NO2	1-hr	14.49	14.21	26.17	27.08	26.95	6.04	134.91	157.87	0.00	325.89	7.5
NO2	Annual	0.080	0.077	0.024	0.024	0.026	0.079	0.281	0.216	0.000	0.68	1
CO	1-hr	11.03	10.85	23.90	24.72	24.65	9.65	54.91	15.37	0.00	104.64	2000
CO	8-hr	1.84	1.87	3.70	4.38	4.70	6.16	32.24	9.92	0.00	19.64	500
SO2	1-hr	4.21	4.14	2.60	2.68	2.71	0.14	0.36	0.43	0.00	5.14	7.8
SO2	3-hr	1.48	1.41	1.05	0.89	0.91	0.09	0.30	0.35	0.00	1.83	25
SO2	24-hr	0.31	0.29	0.19	0.22	0.25	0.08	0.17	0.21	0.00	0.44	5
SO2	Annual	0.023	0.022	0.002	0.002	0.003	0.002	0.001	0.001	0.000	0.029	1
PM10	24-hr	0.65	0.62	1.40	1.58	1.78	0.71	1.88	2.56	0.18	3.05	5
PM10	Annual	0.048	0.047	0.018	0.018	0.018	0.016	0.009	0.007	0.008	0.106	1
PM2.5	24-hr	0.65	0.62	1.40	1.58	1.78	0.71	1.88	2.56	0.18	3.05	1.2
PM2.5	Annual	0.048	0.047	0.018	0.018	0.018	0.016	0.009	0.007	0.008	0.106	0.3

Concurrent Operations
Emergency Generator 1
Firepump 1

- 1 - Cumulative impacts conservatively assume that all sources have maximum impact at the same location
- 2 - Short-term individual source impacts are based on 24 hour per day operation.
- 3 - Short term total impacts are based on the maximum turbine, auxiliary boiler and cooling tower impacts with 1 hour of maintenance of the generator and firepump.
- 4 - Maximum 1-hr SO2 and PM values from the generator and firepump are not restricted by hours of operation.
- 5- Default ambient ratio of 0.80 used to convert modeled NOx impacts to NO2 impacts

Table 6-15
Pioneer Valley Energy Center
Refined Modeling - Pollutant Specific Cumulative Impacts of Project Sources

Pollutant	Averaging Period	Source/ Load	Predicted Impact Concentrations (ug/m ³)							SIL
			2006	2007	2008	2009	2010	Avg	Max	
			Generator or Firepump with Turbine, Aux Boiler							
NOx	1-hr	Generator	105.60	114.90	111.30	120.60	123.40	115.16	123.40	
	1-hr	Firepump	135.90	135.10	129.40	121.80	118.40	128.12	135.90	
NO2	1-hr	Generator	84.48	91.92	89.04	96.48	98.72	92.13	98.72	7.5
	1-hr	Firepump	108.72	108.08	103.52	97.44	94.72	102.50	108.72	7.5
			Generator and Firepump without Turbine Operations							
PM2.5	24-hr	Generator	1.60	1.40	1.80	1.50	1.70	1.60	1.80	1.2
	24-hr	Firepump	2.40	2.60	1.90	1.50	2.20	2.12	2.60	1.2
			Generator and Firepump Testing							
PM2.5	1-hr	Generator	3.93	3.59	3.49	3.62	3.76	3.68	3.93	
	1-hr	Firepump	5.10	5.09	5.37	4.96	4.07	4.92	5.37	
	1-hr	Generator & Firepump	6.38	6.47	6.27	6.29	5.51	6.18	6.47	
	24-hr	Generator & Firepump	0.27	0.27	0.26	0.26	0.23	0.26	0.27	1.2
			Turbine, Cooling Tower and Auxiliary Boiler							
PM2.5	24-hr	CT @ 100%	0.94	1.14	1.16	1.28	1.40	1.18	1.40	1.2
	24-hr	CT @ 60%	1.17	1.28	1.33	1.57	1.84	1.44	1.84	1.2
			Normal Turbine Operations with Generator/Firepump Maintenance							
PM2.5	24-hr	CT @ 100%	1.21	1.41	1.42	1.54	1.63	1.44	1.63	1.2
	24-hr	CT @ 60%	1.44	1.55	1.59	1.83	2.07	1.70	2.07	1.2

1 - 1-hr PM values from the generator and firepump are based on maintenance only between 8am and 5pm.

2 - Default ambient ratio of 0.80 used to convert modeled NOx impacts to NO2 impacts

Table 6-17a
Pioneer Valley Energy Center
Refined Modeling - 98th Percentile Daily Maximum 1-Hour NO₂ Concentrations at Controlling Receptor

Sources	Turbine, Aux Boiler, Generator					
Year	2006	2007	2008	2009	2010	Average
Time Period	10/17 hr 16	7/26 hr 12	12/28 hr 16	4/27 hr 13	4/2 hr 13	
Location						
	656518.1	656518.1	656518.1	656518.1	656518.1	
UTM E (meters)	4669908	4669908	4669908	4669908	4669908	
NO _x Concentration (ug/m3)	90.98	92.59	104.43	109.18	107.40	100.92
NO ₂ Concentration (ug/m3)	72.78	74.07	83.55	87.35	85.92	80.73
Sources	Turbine, Aux Boiler, Firepump					
Year	2006	2007	2008	2009	2010	Average
Time Period	6/28 hr 9	4/3 hr 16	4/6 hr 16	12/9 hr 13	3/15 hr 16	
Location						
	686480.6	686480.6	686480.6	686480.6	686480.6	
UTM E (meters)	4670056.9	4670056.9	4670056.9	4670056.9	4670056.9	
NO _x Concentration (ug/m3)	129.55	125.35	124.06	75.99	106.85	112.36
NO ₂ Concentration (ug/m3)	103.64	100.28	99.25	60.79	85.48	89.89

1- Default ambient ratio of 0.80 used to convert NO_x impacts to NO₂ impacts

Table 6-19
Pioneer Valley Energy Center
Comparison of Project Impacts to SILs and NAAQS

Pollutant	Averaging Period	NAAQS (ug / M ³)	Significant Impact Level (ug / M ³)	Maximum Project Impacts		Background Concentration (ug / M ³)	Total Predicted Ambient Concentrations	
				(ug / M ³)	% of SIL		(ug / M ³)	% of NAAQS
CO	1-hr	40,000	2,000	104.6	5%	3,893	3,998	10%
	8-hr	10,000	500	19.6	4%	2,863	2,883	29%
NO ₂	1-hr	188	7.5	89.9	>100%	85	175	93%
		100	1	0.68	68%	31	32	32%
PM ₁₀	24-hr	150	5	1.96	39%	38	40	27%
PM _{2.5}	24-hr	35	1.2	1.96	>100%	28	30	86%
		15.0	0.3	0.11	37%	8.4	9	57%
SO ₂	1-hr	196	7.8	5.14	66%	99	104	53%
	3-hr	1,300	25	1.83	7%	72	74	6%
	24-hr	365	5	0.44	9%	30	30	8%
Annual		80	1	0.03	3%	8	8	10%

Annual

Annual

Table 6-20
Pioneer Valley Energy Center
Comparison of Project Concentrations to PSD Increments

Pollutant	Averaging Period	Maximum Project Impacts (ug/M ³)	PSD Increment
NO ₂	Annual	0.68	25
PM ₁₀	24-hr	1.96	30
	Annual	0.11	17
SO ₂	3-hr	1.83	512
	24-hr	0.44	91
	Annual	0.03	20

Table 6-21
Pioneer Valley Energy Center
Summary of Modeled Ambient Air Impacts on Soils and Vegetation

Pollutant	Averaging Time	Modeling Results ($\mu\text{g}/\text{m}^3$)			Background ($\mu\text{g}/\text{m}^3$)	Total Impact ($\mu\text{g}/\text{m}^3$)	Sensitivity Screening Levels ($\mu\text{g}/\text{m}^3$) ¹		
		Modeled Impact	Scaling Factor	Impact			Sensitive	Intermediate	Resistant
SO ₂	1 hr	5.14	1.11	9.4	99	108	917	NA	NA
	3 hrs	1.83	1.00	1.8	72	74	786	2,096	13,100
	Annual	0.029	1.00	0.03	8	8	18	18	18
NO ₂	4 hrs		11.25	7.7	110	118	3,760	9,400	16,920
	8 hrs		8.75	6.0	110	116	3,760	7,520	15,040
	1 month		5.00	3.4	110	113	564	564	564
	1 year	0.68	1.00	0.7	31	32	94	94	94
CO	1 hour	104.6	1.00	104.6	3,893	3,998	NA	NA	NA
	1 week		0.4	41.8	2,863	2,905	1,800,000	NA	18,000,000

¹ The Sensitivity Screening Levels are from Table 3.1 of the EPA's "A Screening Procedure for the Impacts of Air Pollution on Plants, Soils and Animals" (EPA, 1980)