

Upgrade and Optimization Project at The Premcor Refining Group Inc.

Public Hearing Monday, August 18, 2008



**DNREC – Air Quality Management
New Castle, Delaware**

Blue Skies Delaware; Clean Air for Life

Purpose

- To describe the project
- Solicit comments
- Premcor requested this hearing be held at the conclusion of the 30 day comment period in order to expedite issuance of the permits



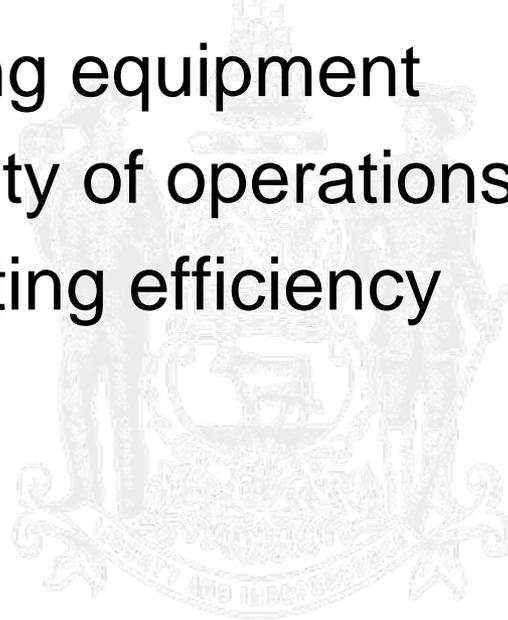
Upgrade and Optimization Project Scope

- Crude Unit upgrade
- Fluid Coking Unit upgrade
- Propylene Dryer and Splitter installation
- Sour Water Stripping System upgrade
- Fuel Gas Scrubbing System upgrade



Upgrade and Optimization Project Scope

- Install new NOx controls for Crude heaters
- Upgrade existing equipment
- Improve flexibility of operations
- Increase operating efficiency



Blue Skies Delaware; Clean Air for Life

Upgrade and Optimization Project Scope

- Modify the firing rates of the 2 Crude Unit Heaters
- Install Selective Catalytic Reduction (SCR) on 2 Crude Unit Heaters to reduce NOx emissions
- Permits for NOx Controls issued on May 14, 2008



Main Permitting Considerations

- Improved efficiency by enhanced heat recovery
- Increase in the FCU coke burn rate from 47.1 Mlb/hour to 60.9 Mlb/hour
- Resizing the hot coke slide valve
- Realize incremental increases in the FCU throughput



Milestone Dates for Application Process

- Jan 07 ~ Aug 07: Review and development of Draft application
- Nov 30, 2007: Revised application submitted superseding all previous versions
- Feb 11, 2008: Application deemed complete
- May 14, 2008: Permits issued for SCR for the crude unit heaters



Project Analysis

- Project application subject to Prevention of Significant Deterioration (PSD) requirements of New Source Review (Reg 1125).
- Best Available Control Technology (BACT) determination for sulfur dioxide (SO₂).
- The preliminary impact air quality analysis indicates incremental SO₂ increases are below significance levels.
- AQM intends approving this project.



NSR Review

- NCCo is classified as being in non-attainment of the NAAQS for Ozone and PM2.5
- NOx and VOCs are Ozone precursors
- SO2 is a PM2.5 precursor
- NA-NSR for NOx, VOCs and PM2.5
- PSD for SO2



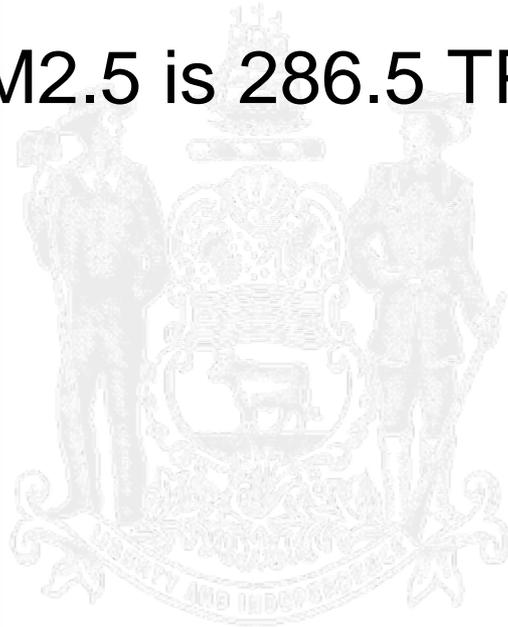
PM2.5 Issue

- On May 16, 2008, EPA provided notice in the Federal Register of the implementation of the NSR program for PM2.5
- Application used PM10 as a surrogate for PM2.5
- Under new rules PM10 cannot be used as a surrogate
- AQM developed alternative review strategy to evaluate PM2.5 emissions changes



Review of PM2.5 Emissions Changes

- PM2.5 = Filterable PM + Condensable PM
- Reduction of PM2.5 is 286.5 TPY



Review of PM2.5 Emissions Changes

- PM2.5 is also relevant for SO2 BACT analysis
- SO2 increases are offset by PM2.5 reductions at 40:1 per revised regulations of May 16, 2008
- 226 TPY SO2 increases requires 5.65 TPY PM2.5 offsets
- FCU reductions are 286.5 TPY
- Additionally, 264.7 TPY PM2.5 reductions are available from FCCU reductions



Project Related Emissions Changes (TPY)

	NO_x	SO₂	VOC	CO	PM/PM₁₀	H₂SO₄	Pb
Crude Unit & Crude Heaters	-58.8	55.3	7.1	89.5	46.2/46.2	2.2	0.001
Fluid Coker	15.3	8.3	0.9	4.1	60.5/-20.5	43.4	0.052
Fugitive Emissions	--	--	5.34	--	--	--	--
SRP	1.7	13.8	0.02	0.09	2.28/2.28	0.27	--
Cooling Tower	--	--	0.5	--	0.27/0.27	--	--
Total	-41.8	77.4	13.8	93.6	109.2/28.3	45.8	0.053



Blue Skies Delaware; Clean Air for Life

Net Emissions Changes from the FCU

Unit	Pollutant (TPY)						
	NO _x	SO ₂	VOC	CO	TSP/PM ₁₀	H ₂ SO ₄	Pb
FCU B/L	674.5	174.0	7.3	690.3	206.3/582.9	252.3	0.065
PTE FCU	780	182.3	8.2	852	266.8/562.4	295.7	0.12
Net Change	105.5	8.3	0.9	161.7	60.5/-20.5	43.4	0.052



Blue Skies Delaware; Clean Air for Life

Significant FCU Emissions Changes

- 105.5 TPY NO_x
- 161.7 TPY CO
- Premcor sought relief from NA-NSR for NO_x by proposing a federally enforceable limit of 698.8 TPY
- Premcor sought relief from PSD-NSR for CO by proposing a federally enforceable limit of 694.4 TPY



Permit Conditions Addressing NSR

- Condition 2.1.2 for NO_x
- Condition 2.1.5 for CO
- Absent these limitations in the permit, this project would be subject to Regulation 1125.2 (Emission Offset Provisions) for NO_x and 1125.3 (Prevention of Significant Deterioration) for CO.



NA-NSR Emissions Analysis

Project Component	NO _x	VOCs	PM ₁₀
DCR UOP	-41.8	13.8	28.3
Creditable Reductions from FCCU LNB Installation ^[1]	-51.6	--	--
Contemporaneous Emissions Changes	117.8	2.2	- 937.3
Net Emissions Changes	24.4	16.0	- 909.0
NA-NSR Significance Threshold	25	25	10
NA-NSR Review Required?	No	No	No

^[1] Premcor is using 51.6 TPY reductions obtained from the FCCU NO_x project when LNBs were installed in 2007 for the FCCU COB, pursuant to paragraphs 11(a), 14 and 17 of the FCCU NO_x Agreement dated July 7, 2007. Additionally, pursuant to paragraph 16 of the FCCU NO_x Agreement, the NO_x reductions of 51.6 TPY shall be made federally enforceable and shall survive the termination of the Agreement.



Blue Skies Delaware; Clean Air for Life

Contemporaneous Netting Analysis for PSD Applicability

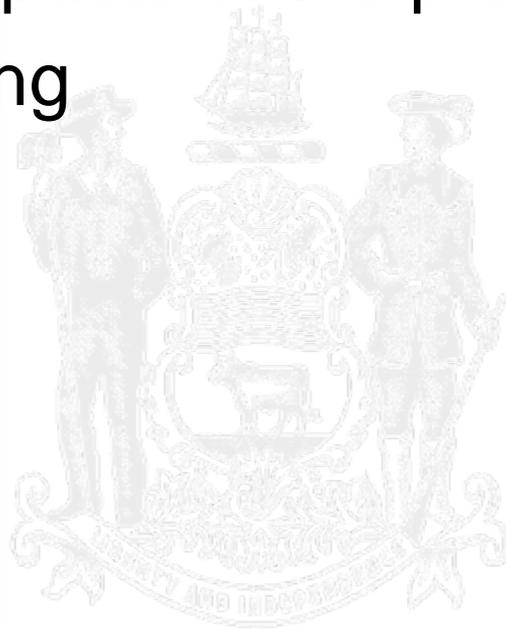
Emissions	SO ₂	PM	PM ₁₀	H ₂ SO ₄
Bin 1 Project	77.4	109.2	28.3	45.8
Contemporaneous Changes	148.5	- 681.0	- 937.3	- 241.2
Total	225.9	- 571.8	- 909.0	- 195.4
PSD Significance level	40	25	15	7
PSD Review Required?	Yes	No	No	No



Blue Skies Delaware; Clean Air for Life

Modeling

- Estimate the impacts of the project's emissions.
- NAAQS Modeling
- PSD Modeling



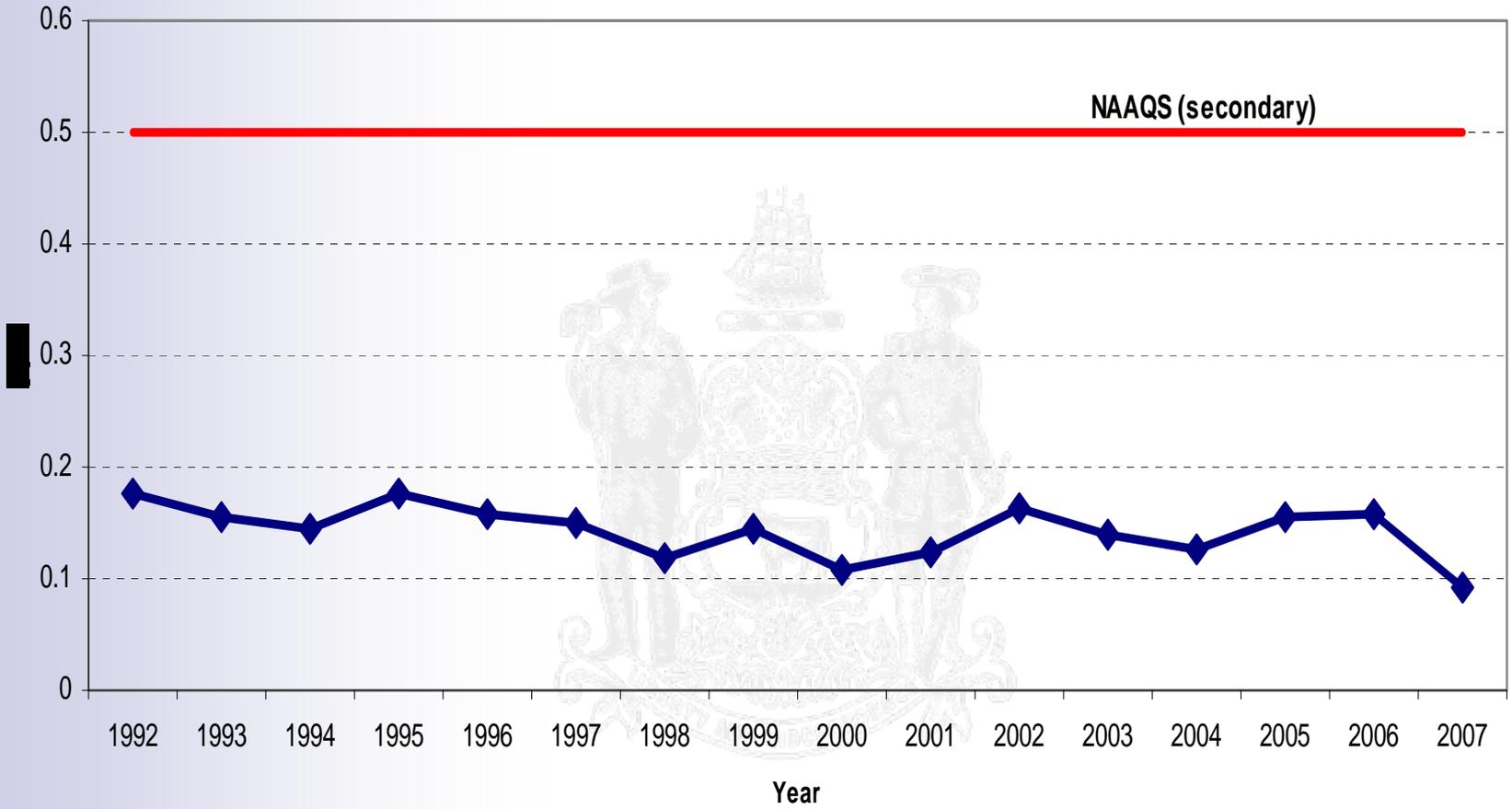
NAAQS SO₂ Modeling

Averaging Period	NAAQS For SO ₂		Year (µg/m ³)					
	Primary	Secondary	Maximum	1991	1992	1993	1994	1995
3-Hour (H2H)	---	1300	128.471	127.713	123.935	125.797	126.892	128.471
24-Hour (H2H)	365	---	66.139	61.258	65.088	63.438	65.130	66.139
Annual (H1H)	80	---	13.740	12.200	12.610	13.036	13.188	13.740



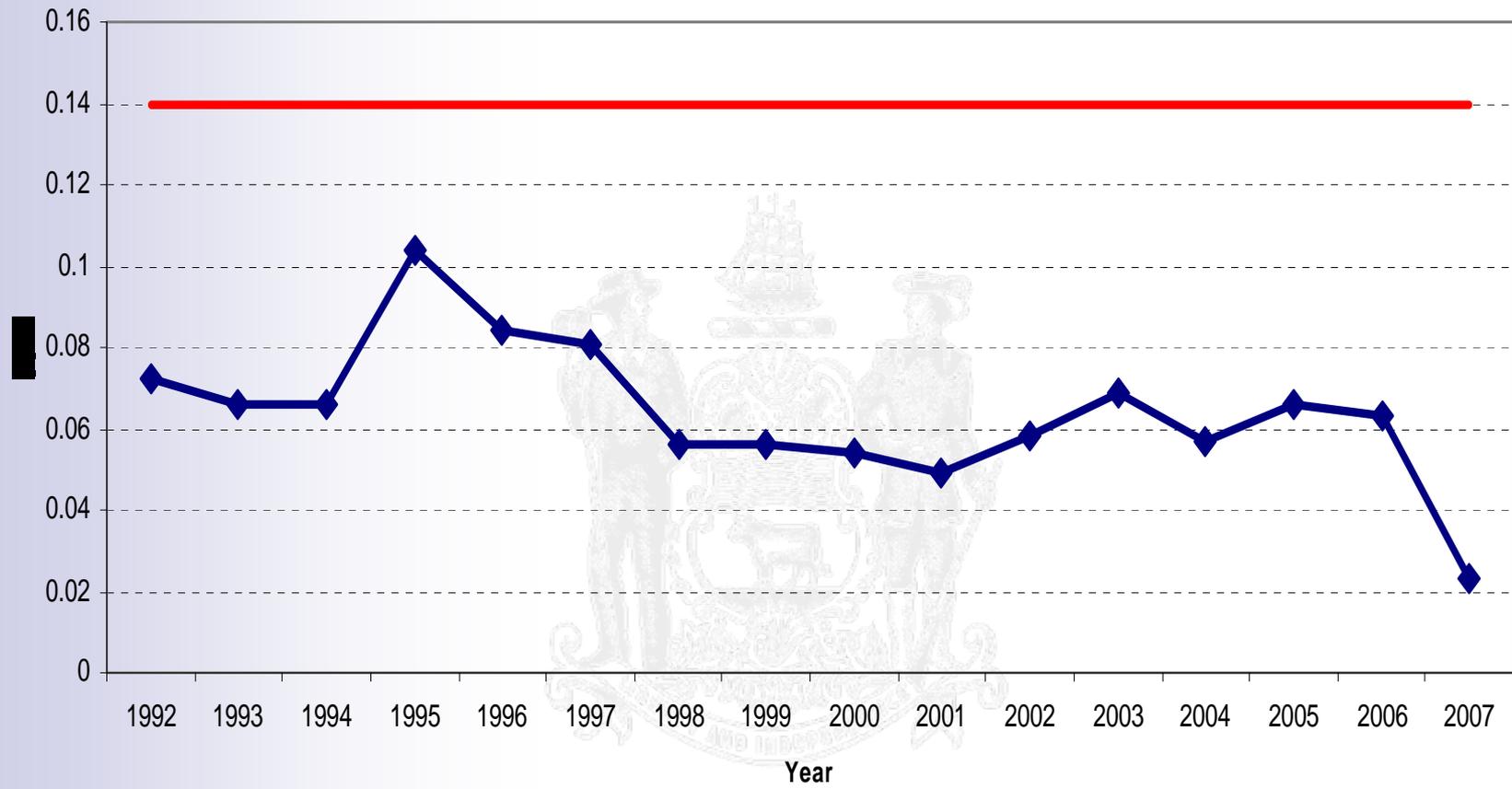
Blue Skies Delaware; Clean Air for Life

Delaware City SO2 - Max. 3-hour Average



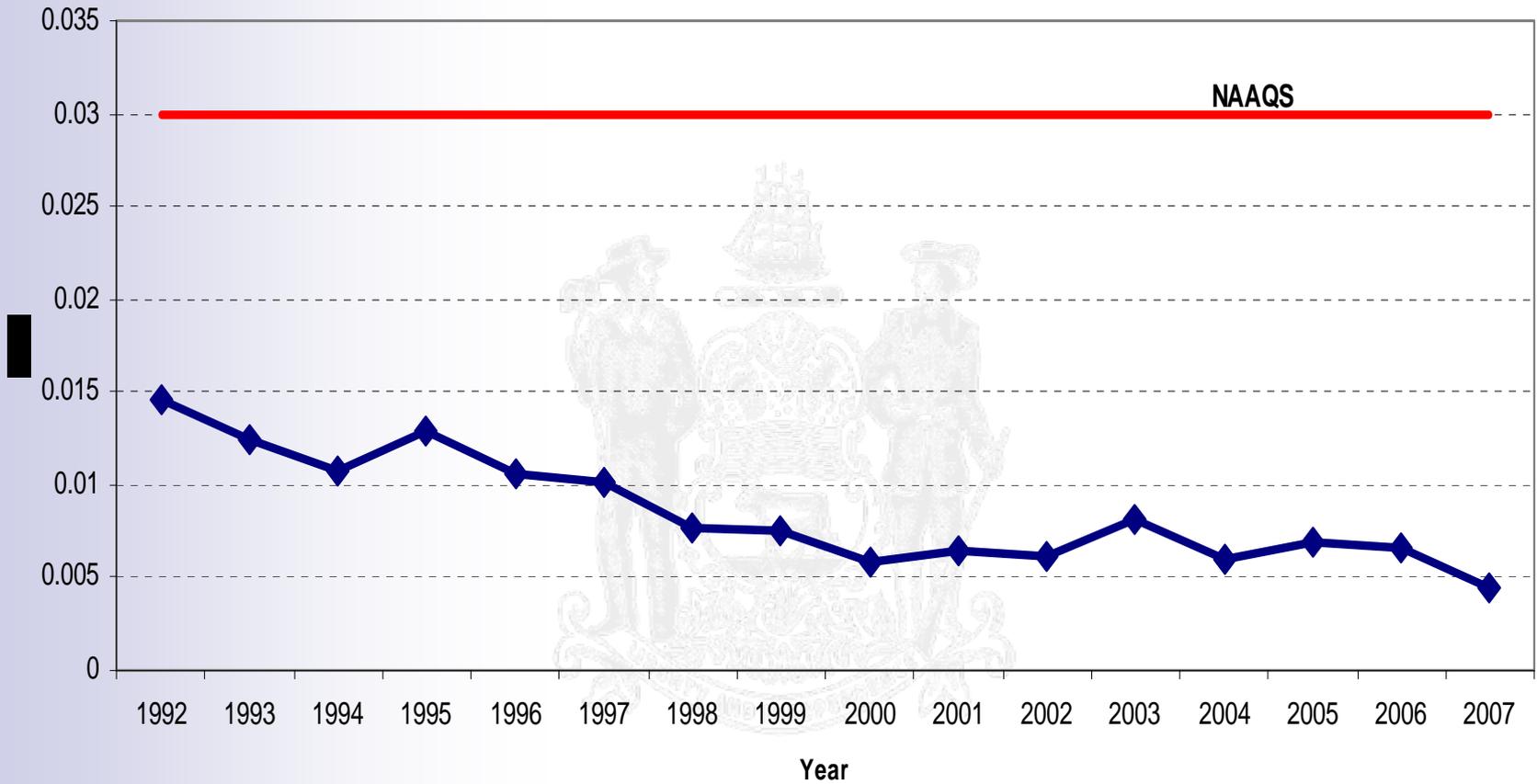
Blue Skies Delaware; Clean Air for Life

Delaware City SO2 - Max. 24-hour Average



Blue Skies Delaware; Clean Air for Life

Delaware City SO2 - Annual Average

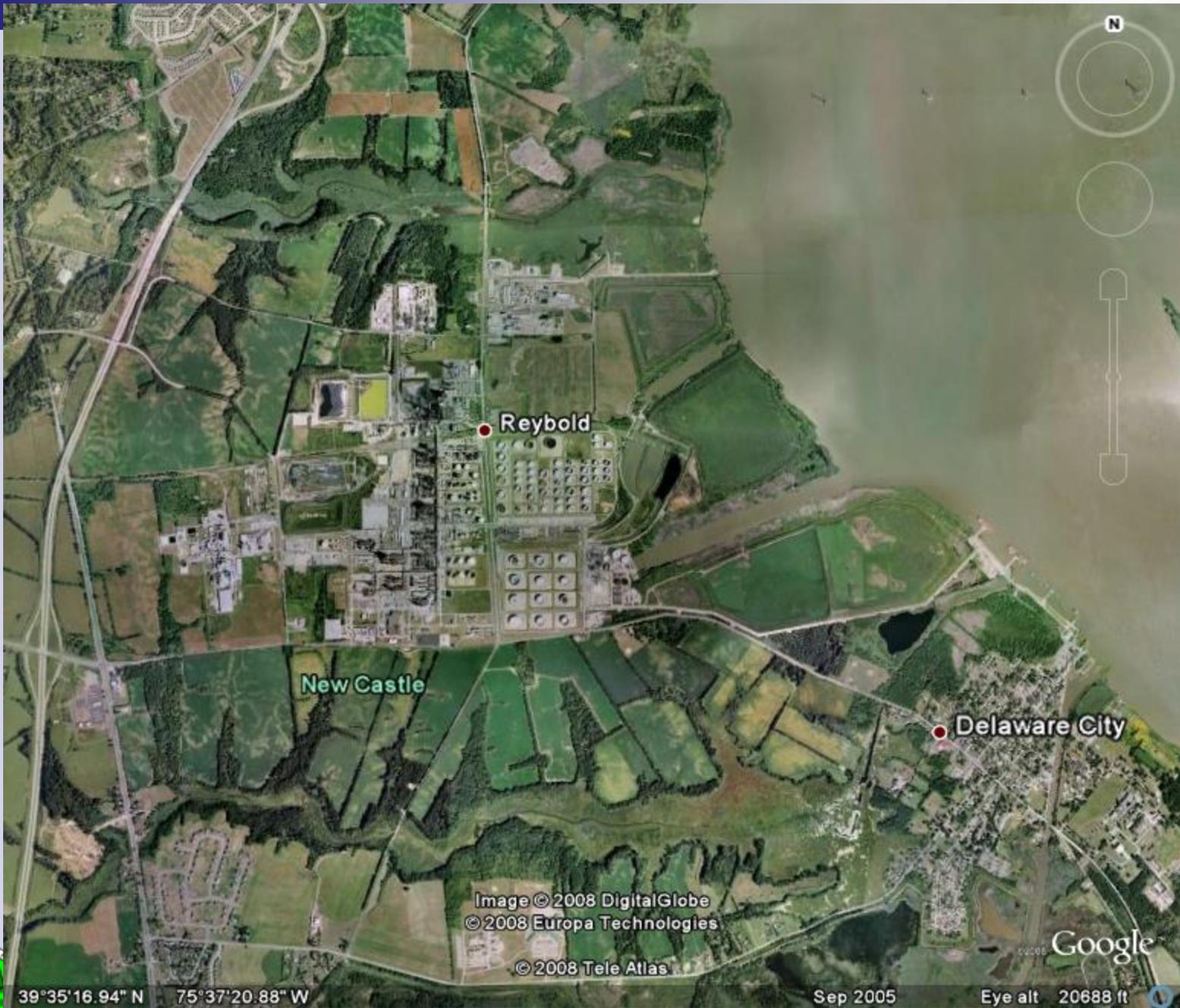


Blue Skies Delaware; Clean Air for Life

PSD Modeling

- Preliminary Impact Air Quality Analysis
 - Determines if a full impact analysis is needed
 - Local Area Impact Analysis
 - Determines if local impacts comply with Significant Impact Levels (SIL)
 - Analysis with EPA guideline model – AERMOD
 - Meteorological data from NWS Wilmington airport processed with AERMET for use with AERMOD
 - Class I Area Impact Analysis
 - Assesses potential impacts on Federal Class I areas (Brigantine NWR, NJ and Shenandoah NP, VA)
 - Consists of a Significant Impact Level (SIL) analysis





Reybold

New Castle

Delaware City

Image © 2008 DigitalGlobe
© 2008 Europa Technologies

© 2008 Tele Atlas

Google

39°35'16.94" N 75°37'20.88" W

Sep 2005

Eye alt 20688 ft





Reybold

New Castle

Delaware City

Image © 2008 DigitalGlobe
© 2008 Europa Technologies

© 2008 Tele Atlas

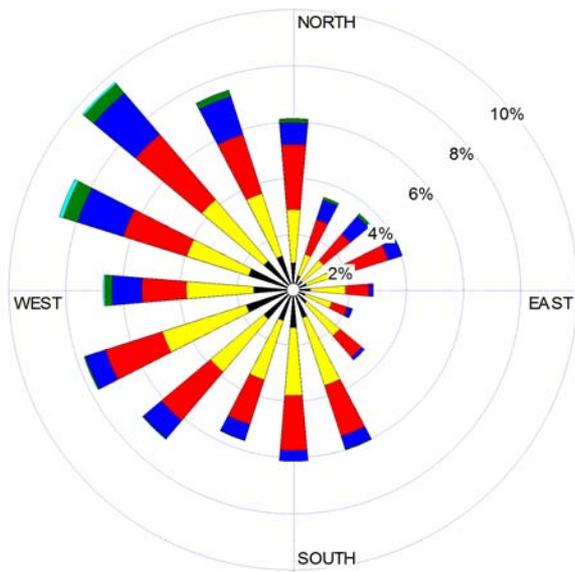
Google

39°35'16.94" N 75°37'20.88" W

Sep 2005

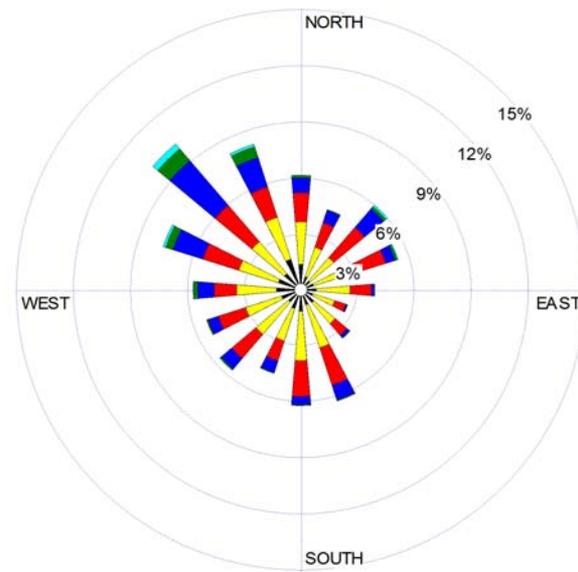
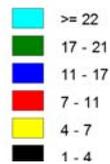
Eye alt 20688 ft





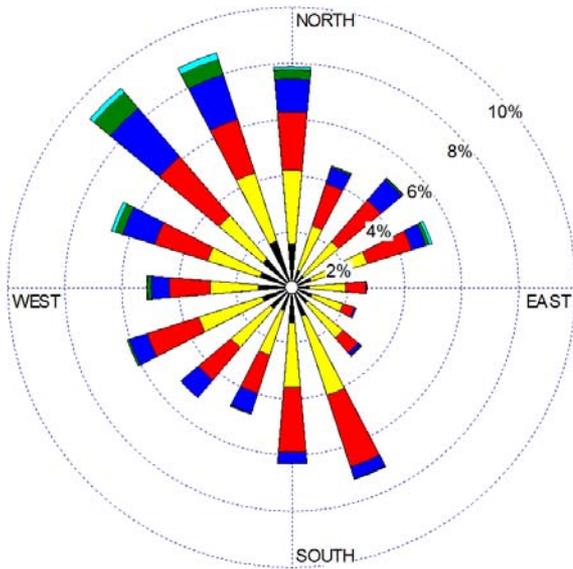
1991 Wind Rose

WIND SPEED
(Knots)



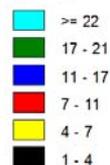
1992 Wind Rose

WIND SPEED
(Knots)

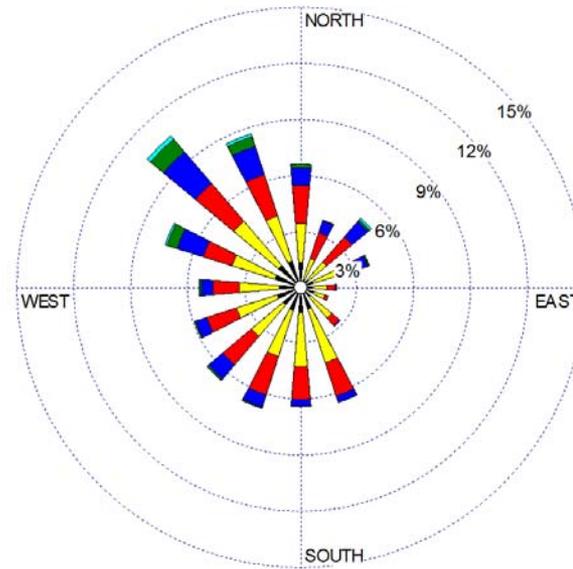


1993 Wind Rose

WIND SPEED
(Knots)



Calms: 9.65%

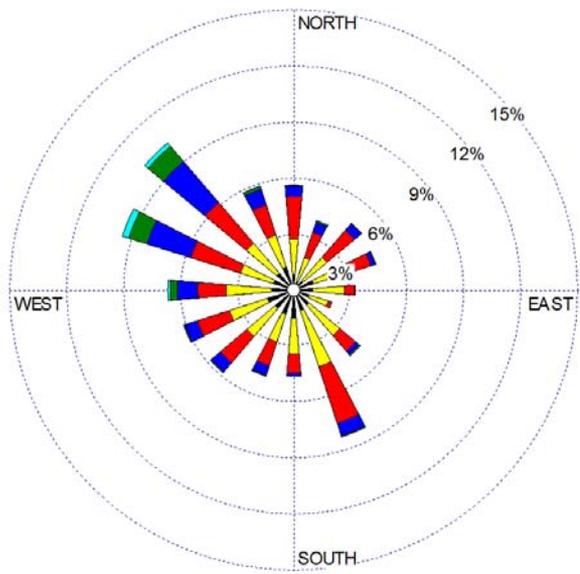


1994 Wind Rose

WIND SPEED
(Knots)



Calms: 10.30%

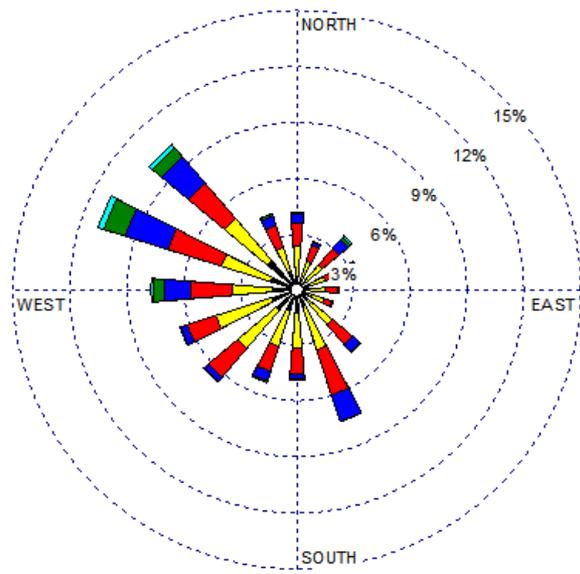


1995 Wind Rose

WIND SPEED
(Knots)

- >= 22
- 17 - 21
- 11 - 17
- 7 - 11
- 4 - 7
- 1 - 4

Calms: 9.00%

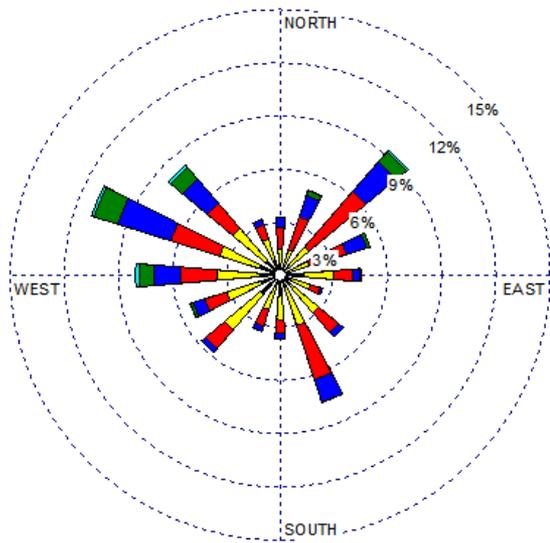


2001 Wind Rose

WIND SPEED
(Knots)

- >= 22
- 17 - 21
- 11 - 17
- 7 - 11
- 4 - 7
- 1 - 4

Calms: 13.23%



2003 Wind Rose

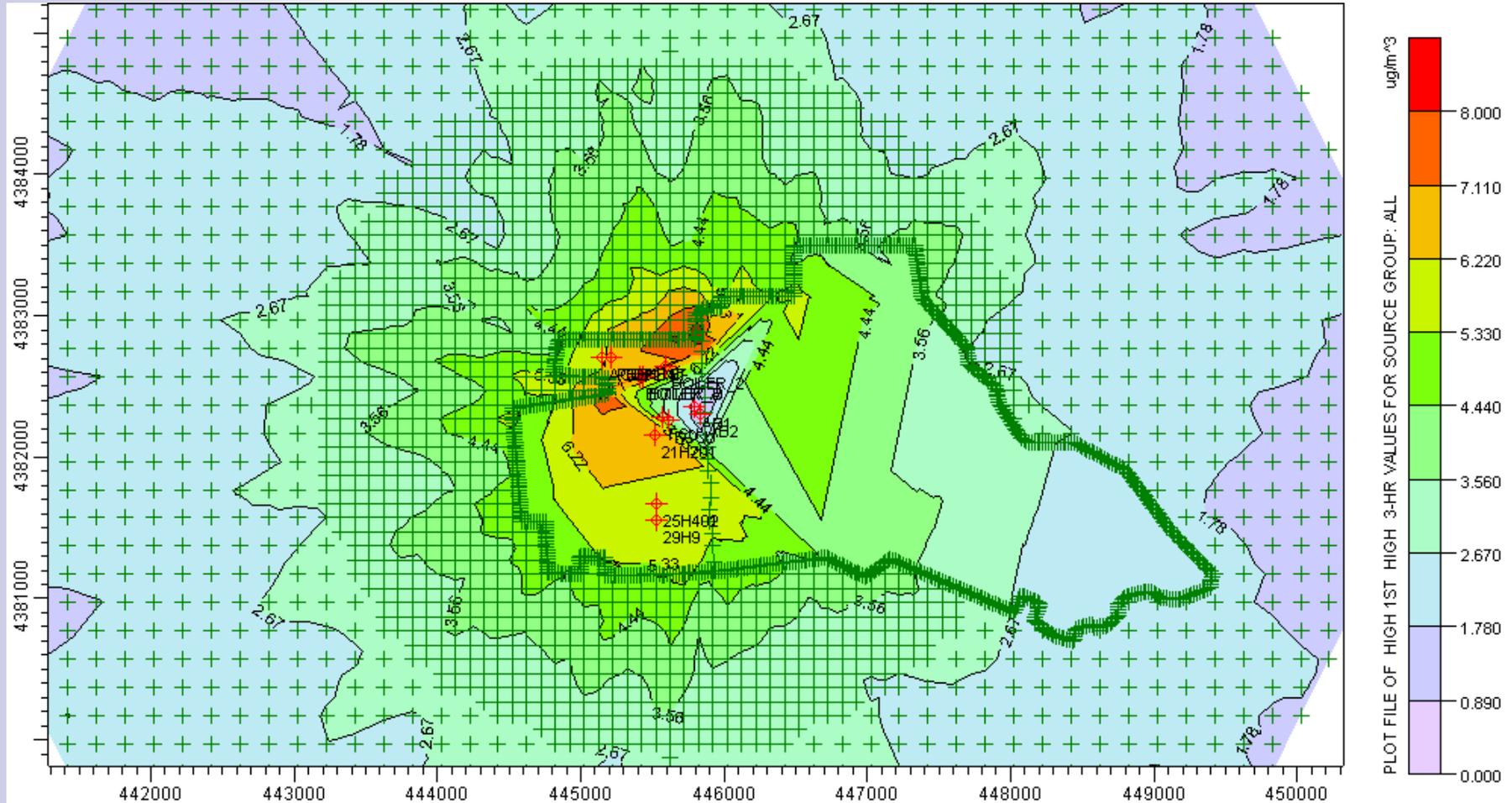
WIND SPEED
(Knots)

- >= 22
- 17 - 21
- 11 - 17
- 7 - 11
- 4 - 7
- 1 - 4

Calms: 8.34%

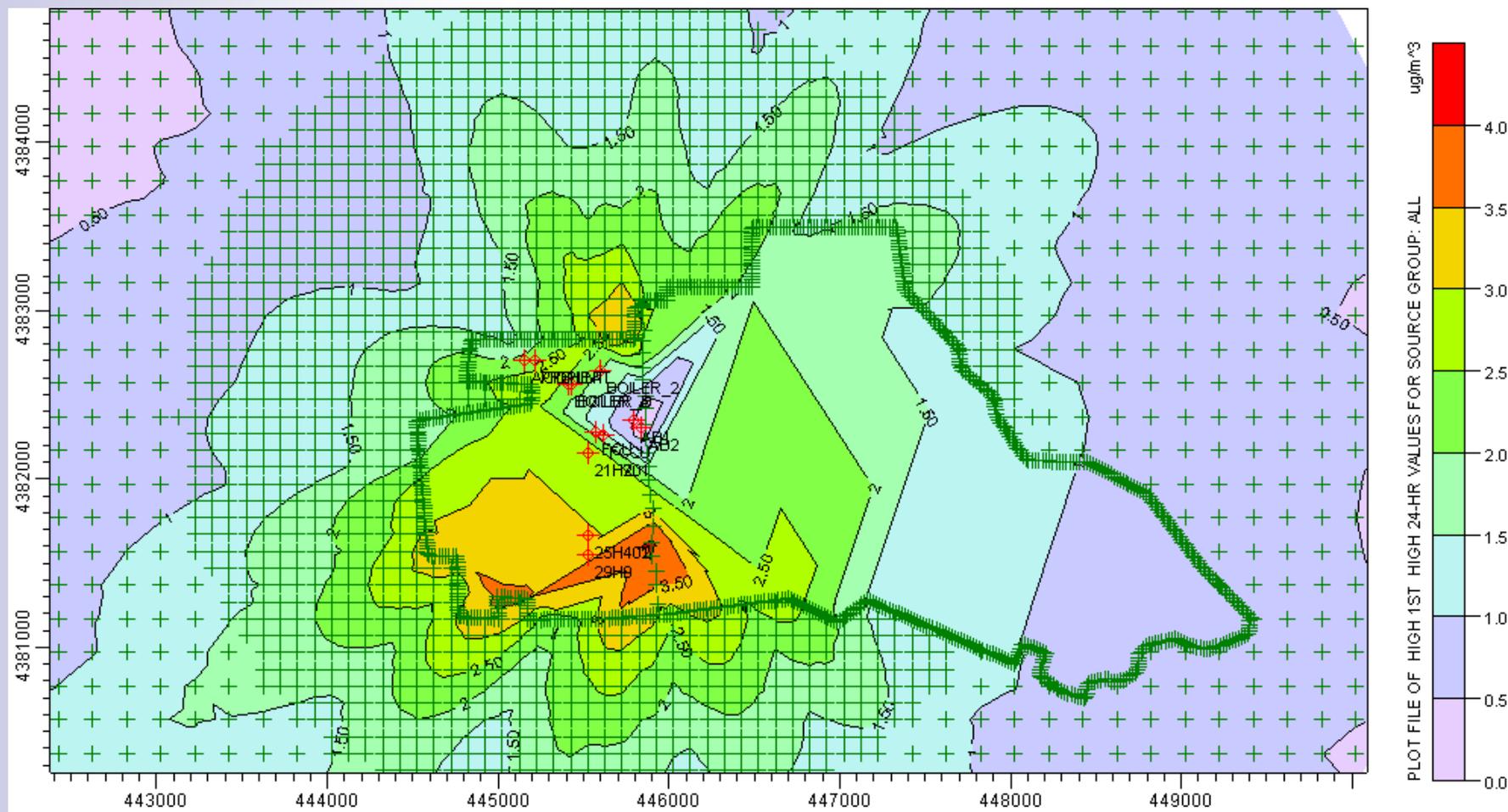
Delaware; Clean Air for Life

Figure 1: AERMOD modeled 3-Hour (Highest-1st-High) SO₂ contours in $\mu\text{g}/\text{m}^3$ for 1992 meteorology



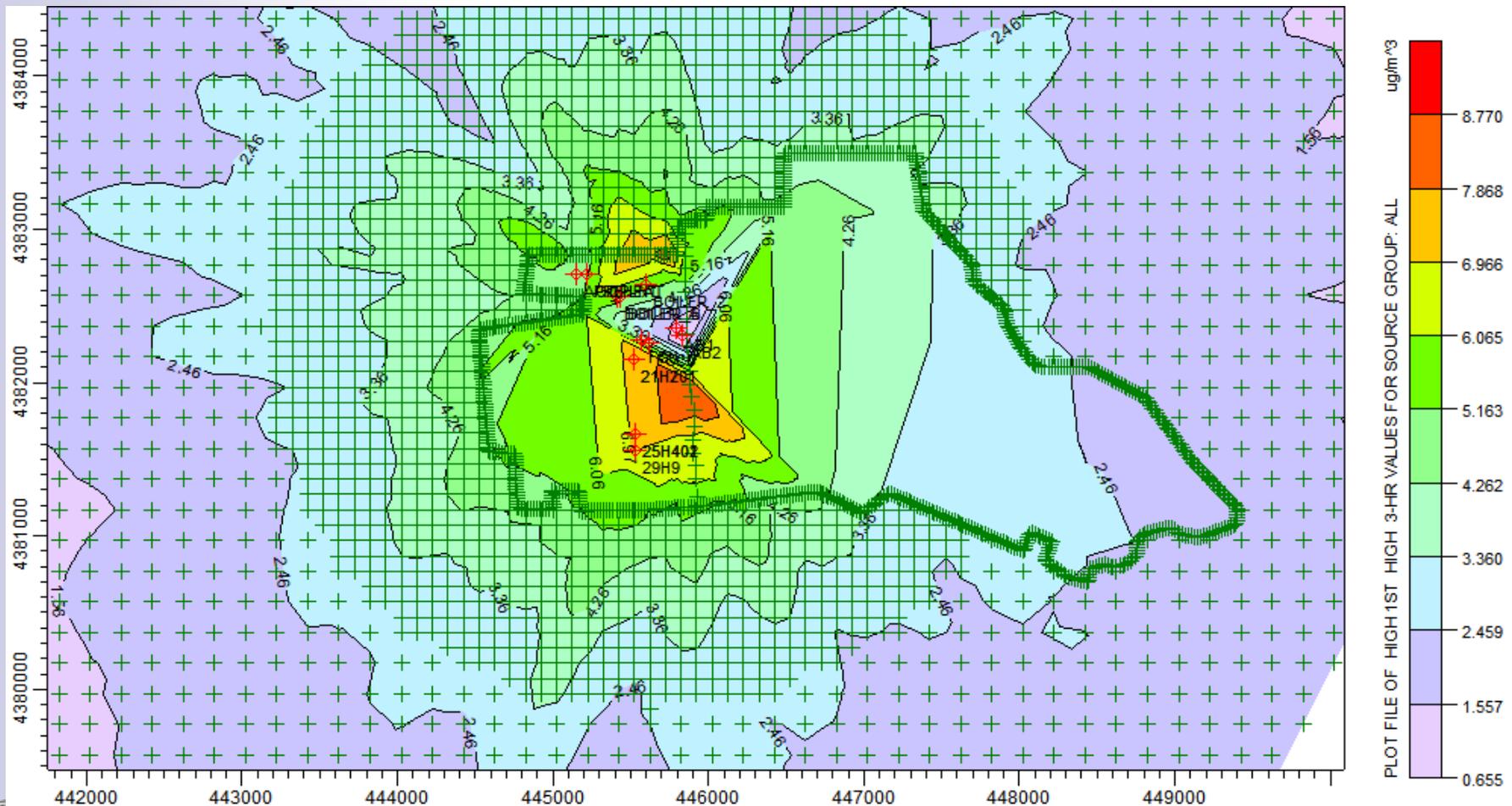
Blue Skies Delaware; Clean Air for Life

Figure 2: AERMOD modeled 24-Hour (Highest-1st-High) SO₂ contours in $\mu\text{g}/\text{m}^3$ for 1993 meteorology



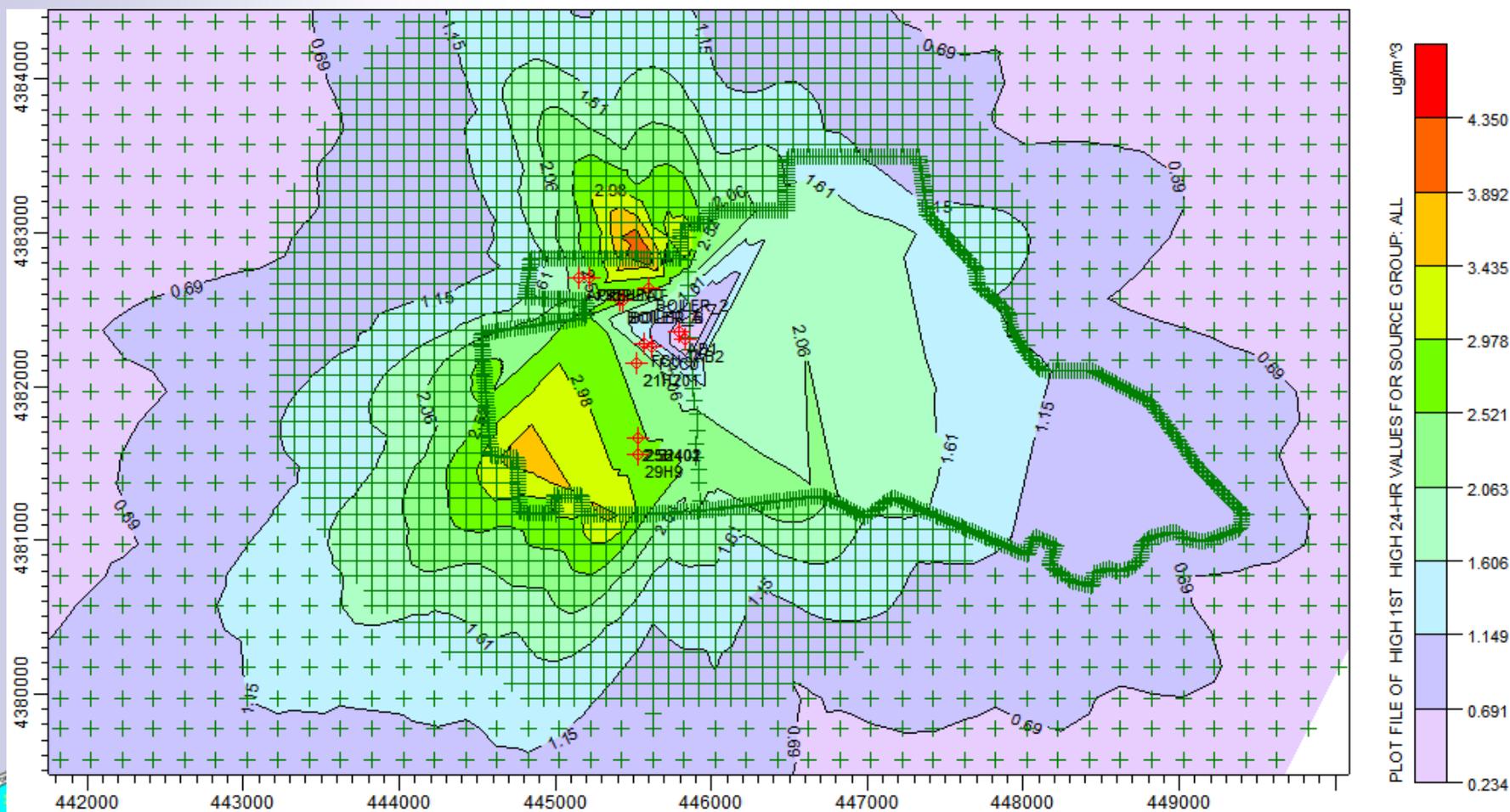
Blue Skies Delaware; Clean Air for Life

Figure 4: AERMOD modeled 3-Hour (Highest-1st-High) SO₂ contours in $\mu\text{g}/\text{m}^3$ for 2003 meteorology



Blue Skies Delaware; Clean Air for Life

Figure 5: AERMOD modeled 24-Hour (Highest-1st-High) SO₂ contours in $\mu\text{g}/\text{m}^3$ for 2003 meteorology



Blue Skies Delaware; Clean Air for Life

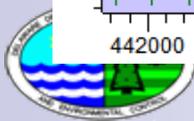
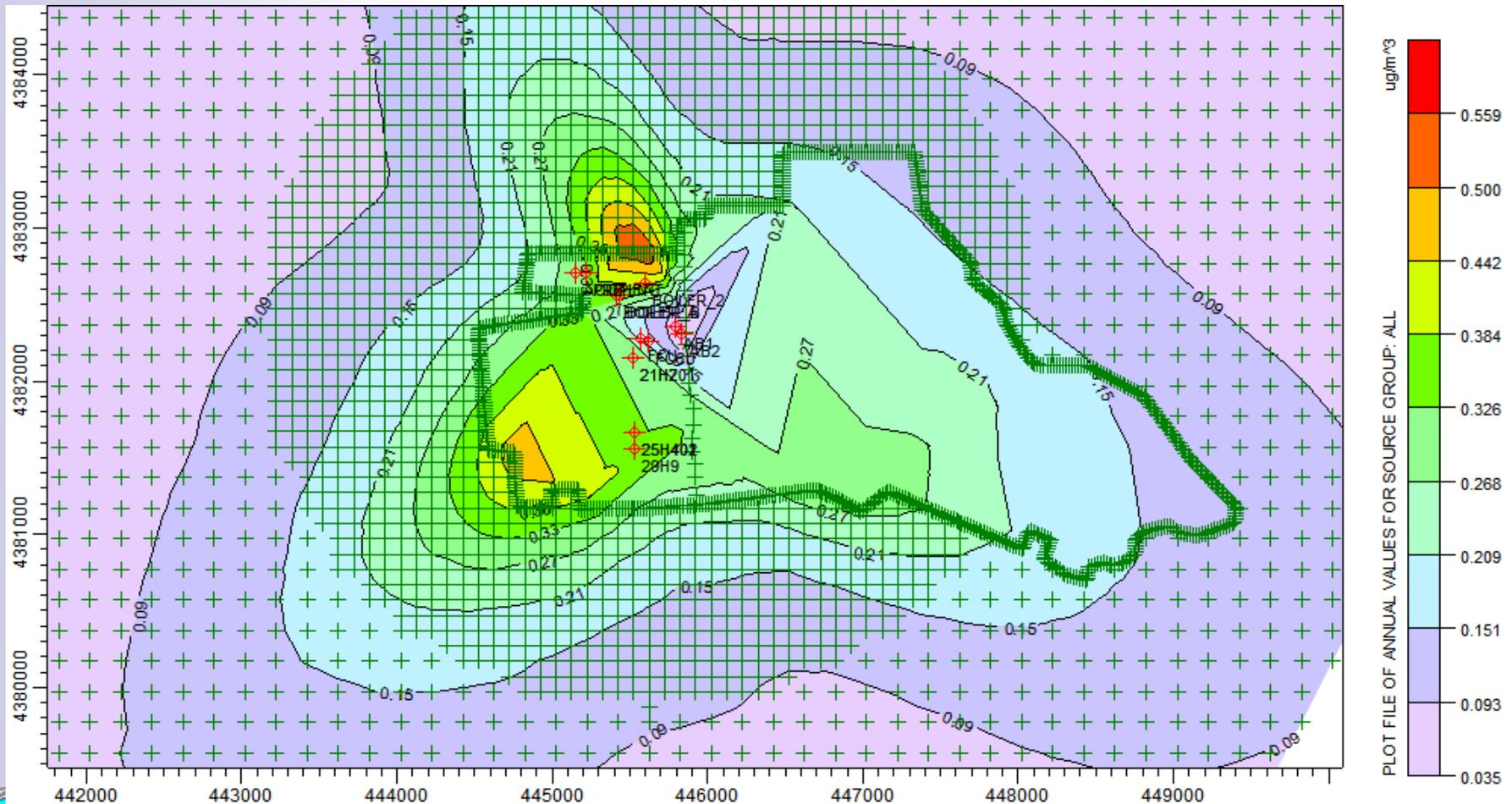


Figure 6: AERMOD modeled maximum annual SO₂ contours in $\mu\text{g}/\text{m}^3$ for 2003 meteorology



Blue Skies Delaware; Clean Air for Life



Summary of AERMOD Modeling Results for SO₂ ($\mu\text{g}/\text{m}^3$)

Averaging Period	Significant Impact Level (SIL)	Year							
		Maximum	1991	1992	1993	1994	1995	<u>2001</u>	<u>2003</u>
3-Hour	25	8.770	8.361	8.460	8.413	7.926	8.372	8.384	8.770
24-Hour	5	4.350	3.617	3.551	4.066	3.642	3.470	3.830	4.350
Annual	1	0.556	0.379	0.393	0.470	0.433	0.488	0.543	0.556



Blue Skies Delaware; Clean Air for Life