

**Region 3 Plan Summary**  
**Warren County, Pennsylvania Sulfur Dioxide (SO<sub>2</sub>) Attainment Plan**

**Title:** Attainment Plan and Contingency Measures for the Warren County SO<sub>2</sub> Nonattainment Area

**Federal Register Dates:** January 17, 2003, 61 FR 2476 (proposed rule), 61 FR 2454 (final rule)

**EPA Effective date:** March 18, 2003

**State Submittal:** December 26, 2001; revision submitted on August 20, 2002

**Affected Areas:** The following municipalities in Warren County: Conowango, Glade, and Pleasant Townships; City of Warren.

**Summary of the Plan:** This SIP revision contains enforceable operating permit emission limitations for the Reliant Warren Generating Station (Permit No. 62-00012) and the United Refining Company (Permit No. 62-017E) and an air quality modeling demonstration indicating attainment of the National Ambient Air Quality Standards (NAAQS) for SO<sub>2</sub> in the specified areas.

Reliant Energy Mid Atlantic Power Holdings LLC (Reliant), (formerly GPU Generation Corporation and formerly Pennsylvania Electric Company) owns and operates the Warren Generating Station. The Station has been in operation since 1948 and consists of four boilers feeding two turbine generators, one gas/oil-fired combustion turbine unit and one oil-fired emergency diesel. Sulfur dioxide emissions are controlled by fuel specification. Ambient air quality modeling indicated that the National Ambient Air Quality Standards (NAAQS) for SO<sub>2</sub> were being exceeded in the Conewango Township area of the Warren Generating Station. United Refining Company owns and operates an oil refinery, which processes fuels and asphalt from crude oil. This facility is located in the City of Warren, Warren County that adjoins Conewango Township.

Glade Township, Pleasant Township, and the City of Warren, PA were designated as nonattainment for sulfur dioxide by EPA on December 21, 1993 (58 FR 67334) . This redesignation was based upon modeled exceedances of the short-term sulfur dioxide standards at the United Refining Company facility.

PADEP granted permission to United Refining Company to model the area, which includes certain high terrain "hotspots" in the immediate vicinity of the facility. The modeling was performed using the EPA Guideline model CTSCREEN, and was completed in April 1993. The modeling showed that the high terrain "hotspots" are in attainment of the NAAQS for SO<sub>2</sub>. PADEP submitted a combined SIP revision for the SO<sub>2</sub> nonattainment area of Conewango Township, and to redesignate the nonattainment areas of Glade Township, Pleasant Township,

and the City of Warren on September 26, 1995. The EPA reviewed this SIP revision and requested additional modeling. Because of the interaction between the Conewango Township nonattainment area and the Glade Township, Pleasant Township and the City of Warren nonattainment area, PADEP has prepared a combined SIP revision addressing both areas.

**Control Measures/Regulations Included As Part of the Plan:** The purpose of this revision is to ensure the federal enforceability of Operating Permits entered between the Pennsylvania, Department of Environmental Protection, and two sources in Warren County, Pennsylvania. The essential special compliance provisions of the Operating Permits are presented below.

**Warren Generating Station**

Sulfur dioxide emission limitations while operating all four units are:

3-Hour	4.00 pounds per million Btu ( lb SO <sub>2</sub> /MMBtu)
24-Hour	3.53 lb SO <sub>2</sub> /MMBtu
Annual Average	3.53 lb SO <sub>2</sub> /MMBtu

**United Refining Company**

The sulfur dioxide emission rates are the current permit allowable (tabulated below) in the operating permit issued on September 12, 1994. In addition, the United Refinery sources shall comply with all applicable requirements of NSPS 40 CFR 60 Subpart J and Subpart GGG and also with 40 CFR Section 60.4.

The plan approval operating permit for United Refining Company contains the SO<sub>2</sub> emission limitations specified in the following table:

<b>Source</b>	<b>Emissions in pounds per hour</b>	<b>Emissions in tons per year</b>
Boiler house (boiler # 1, 2, and 3)	195.10	854.50
No. 4 Boiler	24.30	106.40
FCC charge heater	1.10	4.90
DHT1 heater	0.10	0.40
Prefractionator Reboilers (East & West)	18.00	78.80
old reformer heater (East reformer heater)	91.30	399.90
crude heater (Wheco)	207.70	909.70

<b>Source</b>	<b>Emissions in pounds per hour</b>	<b>Emissions in tons per year</b>
vacuum heater	0.80	3.50
pretreater heater	28.00	122.60
new reformer heater (West reformer heater)	2.20	9.60
Sat gas reboiler	0.40	1.80
Fluid Catalytic Cracking Unit (FCC Regenerator)	285.00	1248.30
combo flare	0.40	1.80
FCC flare	0.10	0.40
#5 boiler	1.20	5.30
Sat Gas KVG compressor engine	0.10	0.40
T-241 heater (Volcanic heater)	0.30	1.30
Distillate Hydrotreater heater (DHT2)	33.40	146.30
Sulfur Recovery Unit 2 (SRU2) incinerator	12.00	52.60
SRU2 hot oil heater	0.10	0.40
Old FCC unit only to be used when new FCC charge heater not in use		
West FCC KVG compressor engine standby basis only		
Middle FCC KVG compressor engine	0.14	0.60
East FCC KVG compressor	0.14	0.60
VCU Unit	0.81	0.76
<b>Total Allowable</b>	<b>902.69</b>	<b>3950.86</b>

For all sources except the SRU2 incinerator and the FCC regenerator compliance is determined by means of a CEM required to be installed and operated to monitor the hydrogen sulfide concentration in the refinery fuel for the source. Compliance is determined for the SRU2 incinerator and the FCC regenerator must each have a CEM system to monitor the SO<sub>2</sub> emissions from the sulfur recovery unit and the Fluid Catalytic Cracking Unit respectively.

**Predicted Impacts on Ambient Air Quality:** A dispersion modeling analysis was performed to demonstrate compliance with the sulfur dioxide NAAQS. The models used in the compliance analysis included the Large Area Power Plant Effluent Study (LAPPES) model, the Rough Terrain Diffusion Model (RTDM), and the Multiple Point with Terrain (MPTER) model. Regulatory approval to use the LAPPES model for the Warren Generating Station was obtained as the result of a model performance comparison study which showed that LAPPES is superior to RTDM for determining air quality impacts from the Warren Generating Station in terrain above stack top. At the time of the model performance study RTDM was specified by EPA’s Guideline on Air Quality Models (GAQM) as the preferred model for complex terrain. The MPTER model was, at the time, the screening model preferred by GAQM for simple terrain.

The final dispersion modeling consisted of a combination of modeling results with the model selected according to the source and the relative terrain. For the Warren Station, the LAPPES model was used for receptors in all terrain above stack top. The MPTER model was used for all receptors in terrain below stack top (simple terrain). For the sources at United Refining, the RTDM model was used for all receptors above the calculated plume height. The MPTER model was used for all simple terrain. For receptors above stack top but below plume height estimates were made with both RTDM and MPTER and the higher result, on a receptor-by-receptor basis, was selected as the estimate for that receptor.

The final dispersion modeling, based upon the SO<sub>2</sub> emission limits of sources amended through Operating Permits in addition to a representative background, demonstrate that the maximum SO<sub>2</sub> impacts do not violate the SO<sub>2</sub> NAAQS. The modeled impacts, including background concentrations, are as follows:

<b>Predicted Sulfur Dioxide Impacts (micrograms per cubic meter)</b>			
Period	LAPPES	NAAQS	% of NAAQS
3-Hour	1241.0	1300	95.46%
24-Hour	364.7	365	99.92%
Annual	75.6	80	94.50%

The modeling demonstration shows that the extreme (highest second-high 3-hour and 24-hour) concentrations approach but do not exceed the NAAQS. The maximum modeled annual concentration is about 95% of the NAAQS. All of these concentrations include an estimate of background SO<sub>2</sub>.

**EPA Region 3 Contact:** Ellen Wentworth (3AP21), U.S. EPA Region III  
 1650 Arch Street, Philadelphia, PA 19103-2029  
 (215) 814-2034; [wentworth.ellen@epa.gov](mailto:wentworth.ellen@epa.gov)