

Workgroup Recommendations and Other Potential Control Measures
Stationary Combustion Sources Workgroup

SCS007 – Glass/Fiberglass Furnaces

Control Measure Summary:	Emissions (tons/year) in State of New Jersey	
2002 existing Measure: NSR; PSD; State RACT. <i>Implementation Area:</i> New Jersey	NOx 2002 Uncontrolled (Includes State RACT):	2,700 0 2,700
Candidate Measure 1: Low NOx Burners <i>Measure ID:</i> LNB <i>Emission Reductions:</i> 40 percent from 2009 projection <i>Control Cost:</i> \$ 924 to 2,232 per ton <i>Timing of Implementation:</i> 2009 <i>Implementation Area:</i> New Jersey	NOx 2009 Projected: 2009 Reduction: 2009 Remaining:	2,700 - 794 1,906
Candidate Measure 2: Selective Non-catalytic Reduction (SNCR) <i>Measure ID:</i> SNCR <i>Emission Reductions:</i> 40 percent from 2009 projection <i>Control Cost:</i> \$ 977 to 2,337 per ton <i>Timing of Implementation:</i> 2009 <i>Implementation Area:</i> New Jersey	NOx 2009 Projected: 2009 Reduction: 2009 Remaining:	2,700 - 794 1,906
Candidate Measure 3: Oxyfiring <i>Measure ID:</i> Oxy <i>Emission Reductions:</i> 85 percent from 2009 projection <i>Control Cost:</i> \$ 1,254 to 2500 per ton <i>Timing of Implementation:</i> 2009 and later <i>Implementation Area:</i> New Jersey	NOx 2009 Projected: 2009 Reduction: 2009 Remaining:	2,700 - 1,451 1,249
Policy Recommendation of OTC State/Workgroup Lead: Develop a control strategy that requires implementation of an “oxyfiring” program for each furnace at the next furnace rebuild, occurring at 6-8 year frequency. From 2009 to the completion of the furnace rebuild, the owner/operator could be required to purchase NOx allowances equal to 85% of the actual furnace emissions for the ozone season. Continuous emission monitoring systems would be used to determine emissions.		

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Brief Rationale for Recommended Strategy: Oxyfiring is best implemented, and provides the most effective NOx emission reductions, with a complete furnace rebuild. This control strategy is demonstrated technology and is in use by two glass plants out of six (6) plants in New Jersey. Also, this strategy not only reduces NOx emissions by as much as 90 percent, but will reduce PM 2.5 emissions and energy consumption. Oxyfiring has penetrated into all segments of the glass industry, except into Flat Glass segment.

NJ is recommending emission limits based on OTC's recommendations. Oxyfuel is not required but is one way to meet those limits. This will allow the industry to come up with other innovative techniques that might be implemented during a rebuild.

REFERENCES

European Commission, Integrated Pollution Prevention and Control (IPCC) Bureau. Reference Document on Best Available Control Techniques in the Glass Manufacturing Industry. This document reports 75%-85% reduction in NOx and emission rate of 1.25 to 4.1 lbs NOx /ton. The cost effectiveness was determined to be between \$1,254 to \$2,542 depending on the size of the furnace.

USEPA Alternative Control Techniques Guidelines- NOx Emissions from Glass Manufacturing, EPA-453/R-94-037, June 1994. Oxyfiring reduction to 85%, cost-effectiveness of \$2150-\$5300.

OTC 2006 Control Measure Summary for Glass/Fiberglass Furnaces.

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Emission Rates:

Page 4-21 of the EPA’s *Alternative Control Techniques Document – NOx Emissions from Glass Manufacturing, EPA-453/R-94-037*, provides the following uncontrolled emission rates for the three types of glass manufacturing:

Furnace Type	Average NOx Uncontrolled Emission Rate (lb/ton of glass)
Container Glass	10.0
Flat Glass	15.8
Pressed/blown glass	22.0

The OTC Control Measure Summary Sheet calls for an 85% reduction from uncontrolled emissions based on the use of oxyfiring at rebuild. Table 6.1 of the 1994 ACT document shows the following controlled emission levels for glass furnaces using oxy-firing technology:

Furnace Type	Average NOx Controlled Emission Rate (lb/ton of glass)
Container Glass	1.5
Flat Glass	2.4
Pressed/blown glass	3.3

The following emission rates recommended in OTC Addendum to Resolution 06-02 are based on San Joaquin Valley, CA Rule 4359:

Type of Furnace	Block 24 Hour Average	Rolling 30-Day Average
Container Glass	4.0. pounds of NOx per ton of glass pulled	4.0 pounds of NOx per ton of glass pulled
Fiber Glass	4.0 pounds of NOx per ton of glass pulled	4.0 pounds of NOx per ton of glass pulled
Flat Glass	9.2 pounds of NOx per ton of glass pulled	7.0 pounds of NOx per ton of glass pulled