Georgia Department of Natural Resources
Environmental Protection Division

Pre-emption Waiver Request

for

Low-RVP, Low-sulfur Gasoline

Under

Air Quality Control Rule

391-3-1-.02(2)(bbb)

VOLUME I

ATTACHMENT 3

Georgia Fuel Waiver Justification

Under the Clean Air Act (CAA), the Environmental Protection Agency (EPA) has promulgated nationally applicable federal standards for Reid vapor pressure (RVP) levels and sulfur content in motor vehicle gasoline. Non-identical state controls are generally prohibited with one exception. EPA may approve a non-identical state fuel control measure as a State Implementation Plan (SIP) provision, provided the state can demonstrate that the measure is necessary to achieve the national primary or secondary ambient air quality standard (NAAQS) that the plan implements. EPA has the authority to approve a state fuel requirement as necessary only if no other measures would bring about timely attainment, or if other measures exist but are unreasonable or impractical. The following information details the necessity of the Georgia fuel control measures in allowing the Atlanta 13-county ozone non-attainment area to meet the ozone NAAQS.

"Identify the quantity of emission reductions necessary to achieve 1-hour NAAQS for ozone"

The emission reductions necessary to achieve the 1-hour NAAQS for ozone were presented in the October 28, 1999 SIP, including a calculated "shortfall" for which additional control measures must be identified. Due to the fact that Georgia previously adopted its current RVP and sulfur content fuel control measures as VOC and NO_x control measures and included these measures in prior SIPs, these control measures are actually reflected in the October SIP base emissions inventory. This fact requires an adjustment to the target "shortfall" reductions to remove the effect of the existing fuel control measures which are encompassed by this Georgia fuel waiver request.

The methodology employed to identify this existing fuels effect is included in Attachment 3A. The adjusted "shortfall" indicates that without Georgia fuel, **the additional VOC and NO_x reductions needed for attainment are 62.19 tpd and 41.93 tpd, respectively**.

Additional supporting documentation for the measures encompassed by current ozone attainment planning are included in Attachment 3B.

"Identify possible other control measures and the quantity of reduction each would achieve"

In researching the available VOC and NO_x controls, EPD has relied heavily on the following documents as a basis for the on-going review:

* "Meeting the 15% Rate of Progress Requirement Under the Clean Air Act: A Menu of Options" (STAPPA/ALAPCO, 1993), and
* "Controlling Nitrogen Oxides Under the Clean Air Act: A Menu of Options" (STAPPA/ALAPCO, 1994).

At this time, some fifty options remain in four source categories, including point source, area source,

on-road mobile source and non-road mobile source. These options and the associated 2003 VOC and NO_x reductions estimated for each are listed in table form as Attachment 3C.

"Explain in detail, with adequate factual support, which of those identified control measures are considered unreasonable or impractical"

In 1997, EPD undertook an in-depth study of the economic impact(s) associated with exercising each of the various control measures identified through the review noted above. Assisted by the Environmental Policy Center, School of Policy Studies, Georgia State University, EPD produced a thorough analysis of the costs of implementation not only for the 13-county ozone non-attainment area, but also for a 31-county area surrounding the 13-county area. The full 1997 study area involved was approximately the equivalent of the 43-county UAM domain currently identified as the area of significant impact. A copy of the full study was provided previously as Appendix III in the April 28, 1998 SIP.

The 1997 study concluded that maximizing the reductions associated with VOC did not necessarily result in an optimum reduction in NO_x and vice versa. As a result, EPD elected to pursue a combination of VOC and NO_x control measures which gained the greatest, timely attainment benefits at the least over-all cost. In some cases this method may have involved slightly higher costs per ton of emissions reduction benefit for a single control measure but has generally resulted in a net savings when compared to the implementation of several control measures to achieve equivalent emission reduction benefits.

In lieu of the full report, a summary of the economic costs associated with each of the remaining control options is included in table form as Attachment 3D. A column is included in the table noting which measures have been identified as unreasonable or impractical to fully implement prior to the 2003 attainment date.

"Show that even with the implementation of all reasonable and practical measures the state would still need additional emissions reductions for timely attainment, and the state fuel measure would supply some or all of the additional reductions"

As noted above, the 2003 Atlanta ozone non-attainment plan currently has a calculated VOC and NO_x reduction shortfall of 62.19 tpd and 41.93 tpd, respectively. EPD is currently striving to identify possible enhancements to existing control measures and other practical and timely measures which might address the shortfall and facilitate attainment in 2003.

EPD requests a pre-emption waiver for the RVP and sulfur content controls noted elsewhere in this submittal. Approval of this request will provide 20.9 tpd of NO_x reductions and 44.1 tpd of VOC reductions in support of the 2003 attainment plan. The state must still identify some 21.03 tpd and 18.09 tpd of additional NO_x and VOC reductions, respectively, in order attain the NAAQS in 2003.

ATTACHMENT 3C

Estimated 2003 Reductions For Ozone Control Measures Which Were Considered but Not Implemented As Of May 15, 2000

Control Measure	Applicable ASC, SCC, or SIC	App. Code Percent NOx Reduction	App. Code 2003 Base NOx (tp7/31d)	2003 NOx Reduction (tp7/31d)	App. Code Percent VOC Reduction	App. Code 2003 Base VOC (tp7/31d)	2003 VOC Reduction (tp7/31d)
Point Sources (43-county modeling domain):							
A 0.15 lb/mmBtu NOx limit for 6 Ga. Power plants located in the UAM-IV counties.	4911	64.41%	442.66	285.10	0.00%	3.81	0.00
A 0.20 lb/mmBtu NOx limit for 6 Ga. Power plants located in the UAM-IV counties.	4911	52.55%	442.66	232.60	0.00%	3.81	0.00
A 0.25 lb/mmBtu NOx limit for 6 Ga. Power plants located in the UAM-IV counties.	4911	40.69%	442.66	180.10	0.00%	3.81	0.00
A 0.35 lb/mmBtu NOx limit for 6 Ga. Power plants located in the UAM-IV counties.	4911	16.97%	442.66	75.10	0.00%	3.81	0.00
75% selective catalytic reduction (SCR) for 6 Ga. Power plants located in the UAM-IV counties	4911	75.00%	442.66	332.00	0.00%	3.81	0.00
Air/fuel adjustments for fuel combustion equipment at textile mills.	22xx	14.00%	0.54	0.08	0.00%	2.71	0.00
Low emission combustion (LEC) technology at natural gas distribution facilities.	4924	47.00%	10.28	4.83	0.00%	0.00	0.00
Energy recovery in combustion processes for glass & glassware manufacturing.	3221	3.50%	3.22	0.11	0.00%	0.05	0.00
Electric boost on glass & glassware manufacturing furnaces.	3221	5.00%	3.22	0.16	0.00%	0.05	0.00
Low NOx burners (LNB) for combustion equipment at textile mill product, primary metal industry, transportation equipment, lumber & wood product, paperboard mill, asphalt & coating, hydraulic cement, and air transportation facilities and colleges & universities.	22xx, 33xx, 37xx, 2493, 2631, 2952, 3241, 4512, & 8221	22.66%	12.35	2.80	0.00%	35.23	0.00
Mid-kiln firing for hydraulic cement plants.	3241	30.00%	9.01	2.70	0.00%	0.00	0.00
Over fire air (OFA) for combustion equipment at textile mill product, primary metal industry, transportation equipment, soy bean mill, lumber & wood product, paperboard mill, and air transportation facilities and colleges & universities.	22xx, 33xx, 37xx, 2075, 2493, 2631, 4512, & 8221	18.59%	4.31	0.80	0.00%	35.36	0.00

ATTACHMENT 3C

Control Measure	Applicable ASC, SCC, or SIC	App. Code Percent NOx Reduction	App. Code 2003 Base NOx (tp7/31d)	2003 NOx Reduction (tp7/31d)	App. Code Percent VOC Reduction	App. Code 2003 Base VOC (tp7/31d)	2003 VOC Reduction (tp7/31d)
Oxy-firing (OF) in combustion processes for glass & glassware manufacturing.	3221	85.00%	3.22	2.73	0.00%	0.05	0.00
SCR for combustion equipment at textile mill product, primary metal industry, transportation equipment, soy bean mill, millwork & plywood, miscellaneous wood product, lumber & wood product, paperboard mill, glass & glassware, hydraulic cement, natural gas distribution and air transportation facilities and colleges & universities.	22xx, 33xx, 37xx, 2075, 2436, 2492, 2493, 2631, 3221, 3241, 4924, 4512, & 8221	52.14%	18.63	9.71	0.00%	40.67	0.00
Selective non catalytic reduction (SNCR) for combustion equipment at soy bean mill, millwork & plywood, miscellaneous wood product, glass & glassware, and hydraulic cement facilities.	2075, 2436, 2492, 3221, & 3241	47.26%	15.29	7.23	0.00%	5.49	0.00
Reformulated coatings, automated equipment cleaning devices, & incinerators for furniture & fixtures manufacturing facilities.	25xx	0.00%	0.00	0.00	75.50%	3.47	2.62
Reformulated coatings & incinerators for textile mill product manufacturing facilities.	22xx	0.00%	0.54	0.00	89.60%	2.71	2.43
Incinerators for specific operations for food & kindred products, commercial printing, chemical products, rubber & plastic, paper & allied products, fabricated metal products, non-electrical machinery, electrical equipment, petroleum refining, & air transportation facilities.	20xx, 27xx, 28xx, 30xx, 26xx, 34xx, 35xx, 36xx, 29xx, & 45xx	0.00%	1.49	0.00	56.42%	30.68	17.31
Incinerators & capture systems for transportation equipment facilities.	37xx	0.00%	0.97	0.00	36.90%	19.47	7.18
Incinerators & scrubber systems for stone, clay, & glass products facilities.	32xx	0.00%	13.24	0.00	95.00%	0.30	0.28
Thermal incinerators for graphic arts facilities.	27xx	0.00%	0.01	0.00	71.40%	12.19	8.70
Thermal oxidizers for wood product facilities other than furniture manufacturing.	24xx	0.00%	2.60	0.00	36.80%	14.97	5.51

Control Measure	Applicable ASC, SCC, or SIC	App. Code Percent NOx Reduction	App. Code 2003 Base NOx (tp7/31d)	2003 NOx Reduction (tp7/31d)	App. Code Percent VOC Reduction	App. Code 2003 Base VOC (tp7/31d)	2003 VOC Reduction (tp7/31d)
Area Sources (13-county non-attainment area only):							
A 0.09 lb/mmBtu NOx limit for new residential natural gas water heaters.	2104006000	3.00%	2.47	0.07	0.00%	0.19	0.00
Modulating furnaces for residential LPG & natural gas heaters.	2104006000 2104007000	2.69%	2.88	0.08	0.00%	0.21	0.00
Perforted burners for residential LPG & natural gas heaters.	2104006000 2104007000	6.72%	2.88	0.19	0.00%	0.21	0.00
Low excess air (LEA) requirements or water & steam injection (for LPG boilers only) for industrial & commercial boilers.	2102004000 2102005000 2102006000 2102007000 2103004000 2103005000 2103006000 2103007000	19.62%	65.00	12.76	0.00%	0.57	0.00
Flue gas recirculation (FGR) and water injection (WI) (for natural gas boilers only) for commercial boilers.	2103004000 2103005000 2103006000 2103007000	35.27%	4.34	1.53	0.00%	0.15	0.00
LNBs and FGR (for LPG boilers only) for industrial boilers.	2102004000 2102005000 2102006000 2102007000	49.54%	60.66	30.05	0.00%	0.42	0.00
LNBs and FGR (for LPG boilers only) for commercial boilers.	2103004000 2103005000 2103006000 2103007000	49.58%	4.34	2.15	0.00%	0.15	0.00

Control Measure	Applicable ASC, SCC, or SIC	App. Code Percent NOx Reduction	App. Code 2003 Base NOx (tp7/31d)	2003 NOx Reduction (tp7/31d)	App. Code Percent VOC Reduction	App. Code 2003 Base VOC (tp7/31d)	2003 VOC Reduction (tp7/31d)
SCR (for distillate & residual oil watertube), LNBs (for distillate & residual oil firetube), radiant burners (RBs) (for natural gas), and FGR+LNB (for LPG) for industrial boilers.	2102004000 2102005000 2102006000 2102007000	73.95%	60.66	44.85	0.00%	0.42	0.00
SCR (for residual oil watertube) and (RBs) (for natural gas) for commercial boilers.	2103005000 2103006000	77.89%	3.61	2.81	0.00%	0.13	0.00
SCR (for residual oil watertube), LNB (for distillate oil watertube & firetube & residual oil firetube), RBs (for natural gas), and FGR+LNB (for LPG) for commercial boilers.	2103004000 2103005000 2103006000 2103007000	71.53%	4.34	3.10	0.00%	0.15	0.00
Automated equipment cleaning devices for auto refinishing coating guns.	2401005000	0.00%	0.00	0.00	22.50%	11.64	2.62
High volume and low pressure auto refinishing coating spray systems.	2401005000	0.00%	0.00	0.00	14.00%	11.64	1.63
South Coast Air Quality Management District (SCAQMD) auto refinishing rule.	2401005000	0.00%	0.00	0.00	21.00%	11.64	2.44
SCAQMD surface cleaning rule 1122.	2415000000	0.00%	0.00	0.00	38.00%	6.85	2.60
Low VOC content auto refinishing surface preparation products.	2401005000	0.00%	0.00	0.00	5.70%	11.64	0.66
Onroad Mobile Sources (13-county non-attainment area only, unless otherwise noted):							
GA reformulated gasoline **(45-county fuel control area)**	2201000000 2230000000	5.98%	349.40	20.90	17.03%	259.00	44.10
$450 I/M repair limit, annual inspections for high emitting vehicles, remote sensing of onroad emissions, & up to $500 fines for excessive emissions.	2201000000 2230000000	4.31%	349.40	15.06	16.00%	259.00	41.44
CA reformulated gasoline (CRFG) for onroad vehicles.	2201000000 2230000000	9.13%	349.40	31.89	28.01%	259.00	72.54

Control Measure	Applicable ASC, SCC, or SIC	App. Code Percent NOx Reduction	App. Code 2003 Base NOx (tp7/31d)	2003 NOx Reduction (tp7/31d)	App. Code Percent VOC Reduction	App. Code 2003 Base VOC (tp7/31d)	2003 VOC Reduction (tp7/31d)
OTAG RFG for automobiles.	2201000000 2230000000	7.60%	349.40	26.57	24.71%	259.00	63.99
EPA Phase 1 gasoline for automobiles	2201000000 2230000000	1.01%	349.40	3.54	12.06%	259.00	31.23
EPA Phase 2 gasoline for automobiles	2201000000 2230000000	4.31%	349.40	15.06	24.71%	259.00	63.99
CA reformulated diesel fuel (CRFD) for onroad vehicles.	2201000000 2230000000	2.56%	349.40	8.96	0.00%	259.00	0.00
High cetane diesel fuel for onroad vehicles.	2201000000 2230000000	0.40%	349.40	1.40	0.27%	259.00	0.70
Extend HOV lanes on I-85 between Chamblee-Tucker Rd. & SR316.	2201000000 2230000000	0.38%	349.40	1.33	0.02%	259.00	0.05
Employer based mass transit incentive programs.	2201000000 2230000000	0.01%	349.40	0.03	0.02%	259.00	0.04
Student & staff based college & university rideshare program in ARC region.	2201000000 2230000000	0.01%	349.40	0.02	0.01%	259.00	0.03
Transportation management associations around major Atlanta region activity centers	2201000000 2230000000	0.05%	349.40	0.17	0.08%	259.00	0.20
Alternative fuel stations at future multi use transfer centers.	2201000000 2230000000	0.00%	349.40	0.00	0.00%	259.00	0.01
Nonroad Mobile Sources (13-county non-attainment area only):							
Liquefied natural gas dual fuel for railroad switchers.	2260000000 2270000000	2.66%	114.50	3.05	0.00%	90.00	0.00

ATTACHMENT 3D

Explanation For Other Possible Ozone Control Meaures Which Were Considered But Not Implemented As Of May 15, 2000

Control Measure	GSU Report NOx Cost ($/ton)	GSU Report VOC Cost ($/ton)	GSU Report Employ-ment Loss (#)	GSU Report Household Income Loss (million$)	GSU Report Regional Output Loss (million$)	Reason Not Implemented In The Place Of GA Reformulated Gasoline
Point Sources (43-county modeling domain):						
A 0.15 lb/mmBtu NOx limit for 6 Ga. Power plants located in the UAM-IV counties.	1,609	NA	751	145.806	265.536	A similar measure providing more reductions at costs acceptable to Ga. Power is being implemented.
A 0.20 lb/mmBtu NOx limit for 6 Ga. Power plants located in the UAM-IV counties.	1,641	NA	645	125.131	227.884	A similar measure providing more reductions at costs acceptable to Ga. Power is being implemented.
A 0.25 lb/mmBtu NOx limit for 6 Ga. Power plants located in the UAM-IV counties.	664	NA	193	37.531	68.350	A measure providing more reductions at costs acceptable to Ga. Power is being implemented.
A 0.35 lb/mmBtu NOx limit for 6 Ga. Power plants located in the UAM-IV counties.	297	NA	49	9.435	17.183	A measure providing more reductions at costs acceptable to Ga. Power is being implemented.
75% selective catalytic reduction (SCR) for 6 Ga. Power plants located in the UAM-IV counties.	2,864	NA	1576	305.967	557.216	A measure providing similar reductions at costs acceptable to Ga. Power is being implemented.
Air/fuel adjustments for fuel combustion equipment at textile mills.	7,258	NA	NA	NA	NA	Cost more per ton. Not as many NOx or VOC reductions.

Control Measure	GSU Report NOx Cost ($/ton)	GSU Report VOC Cost ($/ton)	Report Employ-ment Loss (#)	Report Household Income Loss (million$)	Report Regional Output Loss (million$)	Reason Not Implemented In The Place Of GA Reformulated Gasoline
Low emission combustion (LEC) technology at natural gas distribution facilities.	1,688	NA	NA	NA	NA	Not as many NOx or VOC reductions.
Energy recovery in combustion processes for glass & glassware manufacturing.	965	NA	NA	NA	NA	Not as many NOx or VOC reductions.
Electric boost on glass & glassware manufacturing furnaces.	6,250	NA	NA	NA	NA	Cost more per ton. Not as many NOx or VOC reductions.
Low NOx burners (LNB) for combustion equipment at textile mill product facilities.	855	NA	2	0.069	0.222	Not as many NOx or VOC reductions.
Low NOx burners (LNB) for combustion equipment at primary metal facilities.	855	NA	0	0.033	0.094	Not as many NOx or VOC reductions.
Low NOx burners (LNB) for combustion equipment at transportation equipment facilities.	2,313	NA	1	0.094	0.437	Not as many NOx or VOC reductions.
Low NOx burners (LNB) for combustion equipment at lumber & wood product facilities.	855	NA	NA	NA	NA	Not as many NOx or VOC reductions.
Low NOx burners (LNB) for combustion equipment at paperboard mill facilities.	855	NA	23	1.311	3.955	Not as many NOx or VOC reductions.
Low NOx burners (LNB) for combustion equipment at asphalt & coating facilities.	855	NA	0	0.001	0.006	Not as many NOx or VOC reductions.
Low NOx burners (LNB) for combustion equipment at hydraulic cement facilities.	1,080	NA	NA	NA	NA	Not as many NOx or VOC reductions.
Low NOx burners (LNB) for combustion equipment at air transportation facilities.	1,259	NA	1	0.056	0.131	Not as many NOx or VOC reductions.

Control Measure	GSU Report NOx Cost ($/ton)	GSU Report VOC Cost ($/ton)	Report Employ-ment Loss (#)	Report Household Income Loss (million$)	Report Regional Output Loss (million$)	Reason Not Implemented In The Place Of GA Reformulated Gasoline
Low NOx burners (LNB) for combustion equipment at colleges & universities.	855	NA	6	0.146	0.231	Not as many NOx or VOC reductions.
Mid-kiln firing for hydraulic cement plants.	530	NA	3	0.194	0.525	Not as many NOx or VOC reductions.
Over fire air (OFA) for combustion equipment at textile mill product facilities.	1,015	NA	NA	NA	NA	Not as many NOx or VOC reductions.
Over fire air (OFA) for combustion equipment at primary metal industry facilities.	1,015	NA	NA	NA	NA	Not as many NOx or VOC reductions.
Over fire air (OFA) for combustion equipment at transportation equipment facilities.	1,026	NA	NA	NA	NA	Not as many NOx or VOC reductions.
Over fire air (OFA) for combustion equipment at soy bean mill facilities.	1,015	NA	NA	NA	NA	Not as many NOx or VOC reductions.
Over fire air (OFA) for combustion equipment at lumber & wood product facilities.	1,015	NA	NA	NA	NA	Not as many NOx or VOC reductions.
Over fire air (OFA) for combustion equipment at paperboard mill facilities.	1,015	NA	10	0.550	1.658	Not as many NOx or VOC reductions.
Over fire air (OFA) for combustion equipment at air transportation facilities.	1,000	NA	NA	NA	NA	Not as many NOx or VOC reductions.
Over fire air (OFA) for combustion equipment at colleges & universities.	1,015	NA	NA	NA	NA	Not as many NOx or VOC reductions.
Oxy-firing (OF) in combustion processes for glass & glassware manufacturing.	3,725	NA	2	0.100	0.198	Cost more per ton. Not as many NOx or VOC reductions.

Control Measure	GSU Report NOx Cost ($/ton)	GSU Report VOC Cost ($/ton)	Report Employ-ment Loss (#)	Report Household Income Loss (million$)	Report Regional Output Loss (million$)	Reason Not Implemented In The Place Of GA Reformulated Gasoline
SCR for combustion equipment at textile mill product facilities.	1,910	NA	5	0.230	0.742	Not as many NOx or VOC reductions.
SCR for combustion equipment at primary metal industry facilities.	1,910	NA	2	0.124	0.358	Not as many NOx or VOC reductions.
SCR for combustion equipment at transportation equipment facilities.	5,220	NA	4	0.357	1.657	Cost more per ton. Not as many NOx or VOC reductions.
SCR for combustion equipment at soy bean mill facilities.	1,910	NA	1	0.118	1.376	Not as many NOx or VOC reductions.
SCR for combustion equipment at millwork & plywood facilities.	1,910	NA	29	1.113	2.694	Not as many NOx or VOC reductions.
SCR for combustion equipment at miscellaneous wood product facilities.	1,721	NA	12	0.444	1.074	Not as many NOx or VOC reductions.
SCR for combustion equipment at lumber & wood product facilities.	1,910	NA	9	0.344	0.832	Not as many NOx or VOC reductions.
SCR for combustion equipment at paperboard mill facilities.	1,910	NA	88	4.979	15.018	Not as many NOx or VOC reductions.
SCR for combustion equipment at glass & glassware facilities.	1,880	NA	7	0.429	0.848	Not as many NOx or VOC reductions.
SCR for combustion equipment at hydraulic cement facilities.	4,005	NA	59	4.165	11.253	Cost more per ton. Not as many NOx or VOC reductions.
SCR for combustion equipment at natural gas distribution facilities.	1,035	NA	10	1.120	4.242	Not as many NOx or VOC reductions.

Control Measure	GSU Report NOx Cost ($/ton)	GSU Report VOC Cost ($/ton)	Report Employ-ment Loss (#)	Report Household Income Loss (million$)	Report Regional Output Loss (million$)	Reason Not Implemented In The Place Of GA Reformulated Gasoline
SCR for combustion equipment at air transportation facilities.	2,865	NA	3	0.213	0.498	Not as many NOx or VOC reductions.
SCR for combustion equipment at colleges & universities.	1,910	NA	21	0.551	0.873	Not as many NOx or VOC reductions.
Selective non catalytic reduction (SNCR) for combustion equipment at soy bean mill facilities.	1,415	NA	NA	NA	NA	Not as many NOx or VOC reductions.
Selective non catalytic reduction (SNCR) for combustion equipment at millwork & plywood facilities.	945	NA	9	0.357	0.863	Not as many NOx or VOC reductions.
Selective non catalytic reduction (SNCR) for combustion equipment at miscellaneous wood product facilities.	854	NA	4	0.142	0.344	Not as many NOx or VOC reductions.
Selective non catalytic reduction (SNCR) for combustion equipment at glass & glassware facilities.	1,415	NA	NA	NA	NA	Not as many NOx or VOC reductions.
Selective non catalytic reduction (SNCR) for combustion equipment at hydraulic cement facilities.	945	NA	8	0.579	1.564	Not as many NOx or VOC reductions.
Reformulated coatings, automated equipment cleaning devices, & incinerators for furniture & fixtures manufacturing facilities.	NA	4,255	16	0.588	1.356	Cost more per ton. Not as many NOx or VOC reductions.
Reformulated coatings & incinerators for textile mill product manufacturing facilities.	NA	2,028	18	0.736	2.369	Cost more per ton. Not as many NOx or VOC reductions.
Incinerators for specific operations for food & kindred products facilities.	NA	1,850	3	0.131	0.305	Cost more per ton. Not as many NOx or VOC reductions.

Control Measure	GSU Report NOx Cost ($/ton)	GSU Report VOC Cost ($/ton)	Report Employ-ment Loss (#)	Report Household Income Loss (million$)	Report Regional Output Loss (million$)	Reason Not Implemented In The Place Of GA Reformulated Gasoline
Incinerators for specific operations for commercial printing facilities.	NA	1,585	95	5.184	9.773	Cost more per ton. Not as many NOx or VOC reductions.
Incinerators for specific operations for chemical products facilities.	NA	3,333	7	0.568	1.473	Cost more per ton. Not as many NOx or VOC reductions.
Incinerators for specific operations for rubber & plastic facilities.	NA	6,098	145	7.361	19.398	Cost more per ton. Not as many NOx or VOC reductions.
Incinerators for specific operations for paper & allied products facilities.	NA	3,338	47	2.620	7.903	Cost more per ton. Not as many NOx or VOC reductions.
Incinerators for specific operations for fabricated metal products facilities.	NA	3,337	12	0.572	1.553	Cost more per ton. Not as many NOx or VOC reductions.
Incinerators for specific operations for non-electrical machinery facilities.	NA	3,247	1	0.031	0.090	Cost more per ton. Not as many NOx or VOC reductions.
Incinerators for specific operations for electrical equipment facilities.	NA	3,347	17	1.131	2.425	Cost more per ton. Not as many NOx or VOC reductions.
Incinerators for specific operations for petroleum refining facilities.	NA	3,342	NA	NA	NA	Cost more per ton. Not as many NOx or VOC reductions.
Incinerators for specific operations for air transportation facilities.	NA	3,342	27	1.969	4.598	Cost more per ton. Not as many NOx or VOC reductions.

Control Measure	GSU Report NOx Cost ($/ton)	GSU Report VOC Cost ($/ton)	Report Employ-ment Loss (#)	Report Household Income Loss (million$)	Report Regional Output Loss (million$)	Reason Not Implemented In The Place Of GA Reformulated Gasoline
Incinerators & capture systems for transportation equipment facilities.	NA	3,342	28	2.433	11.282	Cost more per ton. Not as many NOx or VOC reductions.
Incinerators & scrubber systems for stone, clay, & glass products facilities.	NA	1,158	8	0.463	0.914	Not as many NOx or VOC reductions.
Thermal incinerators for graphic arts facilities.	NA	7,570	349	19.026	35.866	Cost more per ton. Not as many NOx or VOC reductions.
Thermal oxidizers for wood product facilities other than furniture manufacturing.	NA	4,841	219	8.399	20.330	Cost more per ton. Not as many NOx or VOC reductions.
Area Sources (13-county non-attainment area only):						
A 0.09 lb/mmBtu NOx limit for new residential natural gas water heaters.	1,608	NA	0	0.033	0.125	Not as many NOx or VOC reductions.
Modulating furnaces for residential LPG heaters.	3,545	NA	0	0.013	0.047	Cost more per ton. Not as many NOx or VOC reductions.
Modulating furnaces for residential natural gas heaters.	3,490	NA	NA	NA	NA	Cost more per ton. Not as many NOx or VOC reductions.
Perforted burners for residential LPG heaters.	4,643	NA	0	0.042	0.158	Cost more per ton. Not as many NOx or VOC reductions.

Control Measure	GSU Report NOx Cost ($/ton)	GSU Report VOC Cost ($/ton)	Report Employ-ment Loss (#)	Report Household Income Loss (million$)	Report Regional Output Loss (million$)	Reason Not Implemented In The Place Of GA Reformulated Gasoline
Perforted burners for residential natural gas heaters.	4,694	NA	2	0.250	0.948	Cost more per ton. Not as many NOx or VOC reductions.
Low excess air (LEA) requirements or water & steam injection (for LPG boilers only) for industrial & commercial boilers.	3,301	NA	NA	NA	NA	Cost more per ton. Not as many NOx or VOC reductions.
Flue gas recirculation (FGR) and water injection (WI) (for natural gas boilers only) for commercial boilers.	5,399	NA	NA	NA	NA	Cost more per ton. Not as many NOx or VOC reductions.
LNBs and FGR (for LPG boilers only) for industrial boilers.	8,212	NA	NA	NA	NA	2.8 times the NOx reduction cost. Only 1.5 times the NOx reduction. No VOC reductions.
LNBs and FGR (for LPG boilers only) for commercial boilers.	8,299	NA	NA	NA	NA	Cost more per ton. Not as many NOx or VOC reductions.
SCR (for distillate & residual oil watertube), LNBs (for distillate & residual oil firetube), radiant burners (RBs) (for natural gas), and FGR+LNB (for LPG) for industrial boilers.	4,126	NA	562	28.823	67.097	Cost more per ton.
SCR (for residual oil watertube) and (RBs) (for natural gas) for commercial boilers.	5,517	NA	NA	NA	NA	Cost more per ton. Not as many NOx or VOC reductions.
SCR (for residual oil watertube), LNB (for distillate oil watertube & firetube & residual oil firetube), RBs (for natural gas), and FGR+LNB (for LPG) for commercial boilers.	5,606	NA	238	9.626	16.072	Cost more per ton. Not as many NOx or VOC reductions.
Automated equipment cleaning devices for auto refinishing coating guns.	NA	478	6	0.197	0.280	Not as many NOx or VOC reductions.

Control Measure	GSU Report NOx Cost ($/ton)	GSU Report VOC Cost ($/ton)	Report Employ-ment Loss (#)	Report Household Income Loss (million$)	Report Regional Output Loss (million$)	Reason Not Implemented In The Place Of GA Reformulated Gasoline
High volume and low pressure auto refinishing coating spray systems.	NA	0	NA	NA	NA	Not as many NOx or VOC reductions.
South Coast Air Quality Management District (SCAQMD) auto refinishing rule.	NA	19,769	NA	NA	NA	Cost more per ton. Not as many NOx or VOC reductions.
SCAQMD surface cleaning rule 1122.	NA	221	2	0.072	0.102	Not as many NOx or VOC reductions.
Low VOC content auto refinishing surface preparation products.	NA	1,250	NA	NA	NA	Not as many NOx or VOC reductions.
Onroad Mobile Sources (13-county non-attainment area only, unless otherwise noted):						
GA reformulated gasoline. **(45-county fuel control area)**	2,926	1,387	NA	NA	NA	Implemented & requesting waiver for it.
$450 I/M repair limit, annual inspections for high emitting vehicles, remote sensing of onroad emissions, & up to $500 fines for excessive emissions.	2,417	919	281	10.171	31.325	Not as many NOx or VOC reductions. A similar measure blocked by the legislature.
CA reformulated gasoline (CRFG) for onroad vehicles.	24,094	8,260	13903	469.648	668.259	At least 6 times the cost. Only up to 1.6 times the NOx or VOC reduction.
OTAG RFG for automobiles.	11,636	3,732	5594	188.964	268.876	At least 2.7 times the cost. Only up to 1.5 times the NOx or VOC reduction.

Control Measure	GSU Report NOx Cost ($/ton)	GSU Report VOC Cost ($/ton)	Report Employ-ment Loss (#)	Report Household Income Loss (million$)	Report Regional Output Loss (million$)	Reason Not Implemented In The Place Of GA Reformulated Gasoline
EPA Phase 1 gasoline for automobiles.	63,815	5,579	4089	138.132	196.547	At least 4 times the cost. Not as many NOx or VOC reductions.
EPA Phase 2 gasoline for automobiles.	23,166	5,699	NA	NA	NA	Does not become effective by the attainment deadline. At least 4 times the cost. Only up to 1.5 times the NOx or VOC reduction.
CA reformulated diesel fuel (CRFD) for onroad vehicles.	5,868	NA	476	16.065	22.859	Cost more per ton. Not as many NOx or VOC reductions.
High cetane diesel fuel for onroad vehicles.	18,392	38,411	465	15.709	22.353	Cost more per ton. Not as many NOx or VOC reductions.
Extend HOV lanes on I-85 between Chamblee-Tucker Rd. & SR316.	9,548	254,318	135	5.771	13.512	Cost more per ton. Not as many NOx or VOC reductions.
Employer based mass transit incentive programs.	31,250	23,438	22	0.165	1.156	Cost more per ton. Not as many NOx or VOC reductions.
Student & staff based college & university rideshare program in ARC region.	50,000	41,667	30	0.220	1.541	Cost more per ton. Not as many NOx or VOC reductions.
Transportation management associations around major Atlanta region activity centers.	10,554	9,524	46	0.344	2.407	Cost more per ton. Not as many NOx or VOC reductions.

Control Measure	GSU Report NOx Cost ($/ton)	GSU Report VOC Cost ($/ton)	Report Employ-ment Loss (#)	Report Household Income Loss (million$)	Report Regional Output Loss (million$)	Reason Not Implemented In The Place Of GA Reformulated Gasoline
Alternative fuel stations at future multi-use transfer centers.	129,500	64,750	15	0.114	0.798	Cost more per ton. Not as many NOx or VOC reductions.
Nonroad Mobile Sources (13-county non-attainment area only):						
Liquefied natural gas dual fuel for railroad switchers.	1,049	0	20	1.536	2.521	Not as many NOx or VOC reductions.