Technical Support Document (TSD) for the Final Revisions to the Transport Rule

Docket ID No. EPA-HQ-OAR-2009-0491

Final Revisions Rule State Budgets and New Unit Set-Asides TSD

U.S Environmental Protection Agency

Office of Air and Radiation

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EPA finalized the Transport Rule in July of 2011.[1] EPA is now finalizing revisions to certain states' emission budgets under the Transport Rule as well as revisions to certain new unit set-asides (NUSAs) under the Transport Rule programs. This technical support document shows the underlying data and calculations used to quantify the state budget revisions and new unit set-aside revisions made in the final revisions rule[2], as well as those revisions included in the direct final revisions rule.[3] Section A below summarizes the net impact of the revisions in each rule on each affected state budget and NUSA. Section B below provides a description of each revision and accompanying tables demonstrating the data and calculations associated with each revision as relevant to the final revisions rule; Section C below makes the same demonstration for each revision relevant to the direct final revisions rule. Each revision to a state budget also entails corresponding revisions to the absolute number of allowances put into the relevant new unit set-aside[4] as well as to the absolute assurance level[5] for the relevant pollutant in that state, as NUSAs and assurance levels are both calculated by applying percentage values to the relevant state budget (using the methodologies described in the final Transport Rule).

Section A: Summary of Revisions to States' Emission Budgets and NUSAs.

The final revisions rule affects state emission budgets and/or NUSAs for Arkansas, Florida, Louisiana, Michigan, Mississippi, Nebraska, New Jersey, New York, Texas and Wisconsin. The direct final revisions rule affects state emissions budgets and/or NUSAs for South Carolina, Nebraska, Indiana, Ohio, New York, Kansas, Georgia, Arkansas, Louisiana, Missouri, Mississippi, Texas, Kansas and Oklahoma. These revisions to certain input assumptions at the unit level maintain a consistent application of the methodology described in the final Transport Rule to quantify and eliminate emissions that significantly contribute to nonattainment and interfere with maintenance of the NAAQS assessed in that rulemaking. The revisions to the Transport Rule state budgets and NUSAs are summarized in Tables A.1. and A.2. below.

[1] Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals (76 FR 48208).
[2] See preamble to the "Revisions to Federal Implementation Plans to Reduce Interstate Transport of Fine Particulate Matter and Ozone"
[3] See preamble to the "Revisions to Federal Implementation Plans to Reduce Interstate Transport of Fine Particulate Matter and Ozone: Part II"
[4] The "Total NUSAs" presented for each state in sections B and C of this document include allowances under both the State NUSA and the Indian Country NUSA (where the latter exists in the given state).
[5] EPA has also proposed in this action to amend the effective date of the assurance provisions in all states to start in 2014 instead of in 2012.

Table A.1.: Final Rule Revisions to Transport Rule State Budgets and NUSAs									
	2012 – 2013 State Budgets			2014 and beyond State Budgets			NUSA*		
	SO_2	Annual NO_X	Ozone Season NO_X	SO_2	Annual NO_X	Ozone Season NO_X	SO_2	Annual NO_X	Ozone Season NO_X
Michigan		5,228			5,228			2%	
Nebraska		3,599			3,599			6%	
Texas	50,517	1,375	1,375	50,517	1,375	1,375	5%	4%	4%
Florida			819						2%
Arkansas									5%
Wisconsin		2,473		7,757	2,473		4%	6%	
New York	3,527	3,485	1,911	3,527	3,485	1,911	2%	2%	2%
New Jersey	2,096	952	746		679	349	2%	2%	2%
Louisiana			4,594			4,594			3%
Mississippi			2,154			2,154			2%

* Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

Table A.2.:Direct Final Rule Revisions to Transport Rule State Budgets and NUSAs									
	2012 – 2013 State Budgets			2014 and beyond State Budgets			NUSA*		
	SO_2	Annual NO_X	Ozone Season NO_X	SO_2	Annual NO_X	Ozone Season NO_X	SO_2	Annual NO_X	Ozone Season NO_X
South Carolina	8,013			8,013		0	2%	2%	2%
Nebraska	3,110			3,110			4%	6%	
Indiana	5,338			5,338		0	3%	3%	3%
Ohio	5,163	2,765	1,221	5,163	2,765	1,221	2%	2%	2%
New York	5,444	694	127	5,444	694	127	2%	2%	2%
Kansas	452	640		452	5,794		2%	2%	
Georgia				40,334	13,198	5,762	2%	2%	2%
Arkansas[1]			73			73			8%
Louisiana			89			89			2%
Missouri[2]		26	26		26	26	3%	6%	6%
Mississippi			115			115			2%
Texas		2,731	1,142		2,731	1,142	5%	4%	4%
Oklahoma[3]			859			859			2%

[1] This NUSA level for Arkansas takes effect for the 2014 control period and beyond.
[2] These NUSA levels for Missouri take effect for the 2013 control period and beyond.
[3] Revision applies in 2013 and beyond.

Section B: Technical Revisions to States' Transport Rule (TR) Emission Budgets and NUSAs Relevant to Final Revisions Rule.

1) <u>Michigan</u>

EPA is finalizing an increase to Michigan's 2012 and 2014 annual NO_X budgets as proposed to correct for the assumption that Selective Catalytic Reduction (SCR) technology is currently installed at Monroe Unit 2. This SCR is planned for future installation but is not expected to be operating by 2012

or by 2014. Therefore, EPA is revising the state's 2012 and 2014 annual NO_X emission budgets[6] to reflect projected emissions without this unit operating an SCR. This results in a 5,228 ton increase to the state's annual NO_X budgets in 2012 and 2014. EPA also recognizes that this revised input assumption is relevant to the calculation of the state's ozone-season NO_X budget; EPA already included this revised assumption in its quantification of that budget when the Agency issued the Transport Rule Supplemental Notice of Final Rulemaking (SNFR) (76 FR 87060).

Table B.1.a.: Calculation to Determine Michigan Annual NO_X Budget Revision - Assuming no SCR at Monroe Unit 2

		A	*B*	*C*	*D*	*E*	*F*
Plant	**Unit**	**Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Input from TR_Remedy_Final_2012 (TBtu)**	**Remedy Emission Rate from TR_Remedy_Final_2012 (lbs/MMBtu)**	**Revised Emission Rate (lbs/MMBtu)**	**Revised Emissions**	**Net Budget Revision (1000 tons)**
Calculation				*A*2/B*		*D x B/2*	*E - A*
Monroe	2	1.540	44.437	0.0693	0.3046	6.768	5.228

Columns A, B, and C show the NO_X emissions, heat input, and emission rate from the TR_Remedy_Final_2012 modeling when an SCR is assumed to be present at Monroe Unit 2. Because no SCR is present, EPA modified the emission rate to reflect the "controlled NO_X policy rate" in the NEEDS version from the September 1, 2010 TR Notice of Data Availability (NODA) (column D).[7] This value reflects the NO_X emission rate assumed in EPA's modeling of the Transport Rule as originally proposed, when EPA did not assume an SCR to be present at the unit. This value approximates the emission rate expected at the unit at a cost threshold of $500/ton when no SCR is present at the unit. EPA multiplied this NO_X rate by the remedy heat input shown in column B to obtain a revised emissions projection for the unit (column E). The difference between this revised emission projection (no SCR assumed) and the final Transport Rule remedy analysis emission projection (SCR assumed) determines the amount of the increase to the state's annual NO_X budget (column F).

This budget change will not result in any impact to the percent of the budget set aside for new units. Under the methodology in the final Transport Rule, the NUSA for annual NO_X in Michigan remains at 2%. The original and revised values for the state annual NO_X budget, assurance level, and new unit set-aside are described in the table below.

[6] Throughout this TSD and throughout the preamble to this proposal, EPA refers to a state budget for 2012 and 2013 as a "2012"state budget and refers to a state budget for 2014 and thereafter as a "2014" state budget. Therefore, any revision of a 2012 state budget would apply to the state budget for 2012 and 2013, and any revision of a 2014 state budget would apply to the state budget for 2014 and thereafter.

[7] See National Electric Energy Data System (NEEDS) v4.10 available at http://www.epa.gov/airmarkets/progsregs/epa-ipm/BaseCasev410.html

Table B.1.b.: Impact of Michigan Annual NO_X Budget Revision - Assuming no SCR at Monroe Unit 2 (tons)					
	Annual NO_X Budget	Assurance Level		Total New Unit Set-Aside *	
		% of Budget	Tons	% of Budget	Tons
2012 Initial	60,193	118%	71,028	2%	1,204
2012 Revised	65,421	-	-	2%	1,308
2014 Initial	57,812	118%	68,218	2%	1,156
2014 Revised	63,040	118%	74,387	2%	1,261
*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations					

2) <u>Nebraska</u>

EPA is finalizing, as proposed, an increase to Nebraska's 2012 and 2014 annual NO_X budgets to correct for the assumption that SCR technology is currently installed at Nebraska City Unit 1. There is no SCR existing, planned, or under construction at the unit. There will likely be no SCR available at the time of the 2012 and 2014 compliance periods as originally assumed in EPA's determination of Nebraska's annual NO_X budgets. Therefore, EPA is revising the state's 2012 and 2014 annual NO_X emission budgets to reflect this unit operating without an SCR. This results in a 3,599 ton increase to the state's 2012 and 2014 annual NO_X budgets. The calculations to quantify this revision are shown in the table below.

Table B.2.a.: Calculation to Determine Nebraska Annual NO_X Budget Revision – Assuming no SCR at Nebraska City Unit 1							
		A	*B*	*C*	*D*	*E*	*F*
Plant	**Unit**	**Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Input from TR_Remedy_Final_2012 (TBtu)**	**Remedy Emission Rate from TR_Remedy_Final_2012 (lbs/MMBtu)**	**Revised Emission Rate (lbs/MMBtu)**	**Revised Emissions (1000 tons)**	**Net Budget Revision (1000 tons)**
Calculation				*A*2/B*		*D x B/2*	*E - A*
Nebraska City	1	1.602	45.765208	0.070	0.2273	5.201	3.599

Columns A, B, and C show the NO_X emissions, heat input, and emission rate from the TR_Remedy_Final_2012 modeling when an SCR is assumed to be present. Because no SCR is present, EPA modified the emission rate to reflect the "controlled NO_X policy rate" in the NEEDS version from the September 1, 2010 TR Notice of Data Availability (NODA) (column D).[8] This value reflects the NO_X emission rate assumed in EPA's modeling of the Transport Rule as originally proposed, when EPA did not assume an SCR to be present at the unit. This value approximates the emission rate expected at the unit at a cost threshold of $500/ton when no SCR is present at the unit. This NO_X rate was multiplied by the final remedy heat input shown in column B to obtain a revised emissions value for the unit (column E). The difference between this revised emission projection (no SCR assumed, column E) and the remedy emission projection (SCR assumed, column A) determines the amount of the increase to the state's annual NO_X budget (column F).

The change to the annual NO_X emission budget in Nebraska will result in a small change to the state's new unit set-aside percentage for annual NO_X. The reason for the change is that under the methodology established in the final Transport Rule, the state-specific portion of the NUSA is calculated as the percentage equal to the projected emissions from "planned units" divided by the 2014 state budget for the relevant pollutant. In the case of Nebraska, the projected emissions from planned units remain unchanged, but the budget is increasing. Because the numerator remains unchanged but the denominator is increasing, the total new unit set-aside percentage decreases. That is, a smaller percentage of the state emission budget is needed to cover emissions from "planned" new units, because the budget is larger. For Nebraska, the budget revision would decrease the NUSA percentage for annual NO_X from 7% to 6% as a result. This is applying the same NUSA methodology that is used for every state in the final Transport Rule, and the change in percentage is simply an outgrowth of the state's budget revision. This change in the NUSA percentage yields only a marginal change in the absolute number of allowances in the Nebraska NUSA. The original and revised values for the state annual NO_X budget, assurance level, and new unit set-aside are described in the table below.

Table B.2.b.: Impact of Nebraska Annual NO_X Budget Revision – Assuming no SCR at Nebraska City Unit 1 (tons)

	Annual NO_X Budget	Assurance Level		Total New Unit Set-Aside *	
		% of Budget	Tons	% of Budget	Tons
2012 Initial	26,440	118%	31,199	7%	1,851
2012 Revised	30,039	-	-	6%	1,802
2014 Initial	26,440	118%	31,199	7%	1,851
2014 Revised	30,039	118%	35,446	6%	1,802

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

[8] See National Electric Energy Data System (NEEDS) v4.10 available at http://www.epa.gov/airmarkets/progsregs/epa-ipm/BaseCasev410.html

3) Texas (Removed FGDs)

EPA is finalizing, as proposed, an increase Texas's 2012 and 2014 SO_2 budgets to correct for the assumption that Flue Gas Desulfurization (FGD) technology will be installed by 2012 for W.A. Parish Unit 6, J.T. Deely Unit 1, and J.T. Deely Unit 2. Although the facility owners had previously announced plans to install FGD technology at these facilities, those plans have since been modified. [9] [10] There will likely be no FGD available at these units during the 2012 and 2014 compliance periods under the Transport Rule programs. Therefore, EPA is revising the state's 2012 and 2014 SO_2 emission budgets to reflect these units operating without an FGD. This results in a 26,359 ton increase to the state's 2012 and 2014 SO_2 budgets. The calculations to quantify this revision are shown in the table below.

Table B.3.: Calculation to Determine Texas SO_2 Budget Revision – Assuming no FGD at J.T. Deely or W A Parish unit 6

		A	*B*	*C*	*D*	*E*	*F*
Plant	**Unit**	**Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Input from TR_Remedy_Final_2012 (TBtu)**	**Remedy Emission Rate from TR_Remedy_Final_2012 (lbs/MMBtu)**	**Revised Emission Rate (lbs/MMBtu)**	**Revised Emissions (1000 tons)**	**Net Budget Revision (1000 tons)**
Calculation				*A*2/B*		*D x B/2*	*E - A*
J T Deely	1	0.917	30.55183083	0.060	0.5800	8.860	7.943
J T Deely	2	0.914	30.46546708	0.060	0.5800	8.835	7.921
W A Parish	6	1.211	40.3658592	0.060	0.5800	11.706	10.495
Total							**26.359**

Columns A, B, and C show the SO_2 emissions, heat input, and emission rate from the TR_Remedy_Final_2012 modeling when an FGD is assumed to be present at these three units. Because no FGD is present, EPA is recalculating projected emissions at these units using the emission rates shown for these units in EPA's analysis of the base case for the final Transport Rule, as found in the TR_Base_Case_Final for 2012 (column D). These SO_2 emission rates reflect generation at these units without the operation of the assumed FGDs, which did not operate in the final Transport Rule base case because they were modeled as "dispatchable" controls that were not found to be economic to operate in that scenario.[11] The revised SO_2 emission rate in column D is multiplied by the final remedy heat input shown in column B to obtain a revised emissions projection for the unit (column E). The difference between this

[9] "Corporate Sustainability Report", CPS Energy, 2010. P.57. Retrieved from http://www.cpsenergy.com/files/Sustainability_Report.pdf
[10] Business Wire, (2006). NRG Announces Comprehensive Repowering Initiative [Press release]. Retrieved from http://phx.corporate-ir.net/phoenix.zhtml?c=121544&p=irol-newsArticle_Print&ID=874575&highlight
[11] See **"WebReady_ParsedFile_TR_Base_Case_Final_2012"** in the Transport Rule docket or on EPA's CSAPR website

revised emission projection (no FGD assumed, column E) and the remedy emission projection (FGD assumed, column A) determines the amount of the increase to the state's SO_2 budget (column F).

The impacts of all revisions to the Texas state budgets on the state's NUSAs and assurance levels are shown in Table B.13.e.

4) <u>Texas (FGD Capture)</u>

EPA is also finalizing an increase to the Texas 2012 and 2014 SO_2 budgets to correct for the assumption that the existing FGD technology currently installed at five facilities in Texas (Monticello, Martin Lake, Sandow, Oklaunion, and W A Parish) is capable of treating 100% of the flue gas at those units. Although EPA originally assumed removal rates at those units that the facility operators have previously reported, those facility operators have clarified to EPA that those reported removal rates only applied to the flue gas treated at the unit. Because of design limitations, these facilities may be substantially limited in the amount of flue gas that can be passed through the existing FGD. These facilities report less than 100% pass-through of flue gas on their most recent Energy Information Administration (EIA) 860 form.[12] Consequently, at these facilities, the effective removal rate of the FGD as applied to total SO_2 emissions at the affected units would be lower than the reported removal rate would otherwise indicate. As explained in the final revisions rule preamble, EPA is finalizing this revision based on the SO_2 removal efficiency and flue gas treatment data most recently reported for these scrubbers by the facility operators to the EIA on form 860. The approach results in a final SO_2 budget increase of 24,158 tons.[13]

[12] Unless otherwise indicated, EPA used data from EIA form 860 as submitted for the year 2008 to calculate the revisions presented in this document, as this is the same year for which EPA used EIA form 860 data to inform pollution control removal efficiencies at all units in the Transport Rule power sector modeling.

[13] EPA originally proposed a related budget increase of 43,708 tons, based on the same calculations presented here but using data reported for 2008 on EIA form 923.

Table B.4.: Calculation to Determine Texas SO_2 Budget Revision - Assuming Design SO_2 Removal Rates at FGD and Percent Flue Gas Entering FGD								
		A	B	C	D	E	F	G
		Total SO_2 Emissions from 2012 TR_Remedy_Final (1000 tons)	EIA 860 Removal Rate (used in budget determination)	EIA 860 Percent of Flue Gas Entering FGD	Calculated Removal Rate (used for budget revision estimate)	Uncontrolled Emissions (assuming no FGD)(1000 tons)	Revised Emissions (assuming FGD with revised removal rate) (1000 tons)	Net Budget Revision (1000 tons)
					*B*C*	*A/(1-B)*	*E*(1-D)*	*F-A*
Martin Lake	1	1.862841	0.95	0.95	0.903	37.2568208	3.63254	1.7696989
Martin Lake	2	1.8540181	0.95	0.95	0.903	37.0803634	3.6153354	1.7613172
Martin Lake	3	1.745038	0.95	0.95	0.903	34.9007605	3.4028241	1.6577861
Monticello	3	2.548471	0.95	0.75	0.713	50.96942	14.6537082	12.105237
Oklaunion	1	2.2321097	0.868	0.81	0.703	16.9099223	5.0208941	2.7887843
Sandow	4	1.2522935	0.92	0.83	0.764	15.6536693	3.7005274	2.4482338
W A Parish	8	1.5948385	0.85	0.82	0.697	10.6322566	3.2215737	1.6267352
Total		**13.090**	**6.438**	**6.060**	**5.586**	**203.403**	**37.247**	**24.158**

Column A shows the projected emissions at these units as originally modeled in the final Transport Rule remedy for 2012. Column B shows the SO_2 removal rate that those 2012 emission projections are based on. Column C shows the source reported percent of flue gas entering FGD. Column D shows the emission rate based on multiplying the removal rate by the percent of flue gas entering FGD. Column E shows a calculation of projected emissions at each unit if the previously assumed FGD removal hadn't occurred at all; these "uncontrolled emissions" are calculated in order to allow application of the revised FGD removal rate shown in column D to these uncontrolled emissions, which yields the revised emission projection for each unit in column F. The difference between this revised emission projection (lower FGD capture assumed, column F) and the remedy emission projection (higher FGD capture assumed, column A) determines the amount of the increase to the state's SO_2 budget (column G). The impacts of all revisions to Texas state budgets on the state's NUSAs and assurance levels are shown in Tables B.13.d and B.13.e.

5) Florida

EPA is finalizing, as proposed, a revision to Florida's 2012 ozone-season NO_X budget to correct for the assumption that Crystal River Unit 3, a nuclear unit with no NO_X emissions, will be available for dispatch in 2012. This unit is not expected to operate in 2012 as it is undergoing an extended outage for repair work. EPA is finalizing an increase to the state's 2012 ozone season NO_X budget by 819 tons to reflect projected emissions from increased dispatch of fossil-fuel-fired capacity needed to substitute for the generation that EPA originally projected to come from Crystal River Unit 3. The calculations to quantify this revision are shown in the table below.

Table B.5.a.: Calculation to Determine Florida Ozone-Season NO_X Budget Revisions to Offset Crystal River 3 Outage

		A	*B*	*C*	*D*
Plant Name	**Unit ID**	**Ozone-Season Generation from TR_Remedy_Final_2012 (GWh)**	**Average Heat Rate of Replacement Generation (BTU/kWh)**	**Average Ozone-Season NO_X Emission Rate of Replacement Generation (lbs/MMBTU)**	**Ozone-Season NO_X Emissions from Replacement Generation (tons)**
Calculation					*A*B*C/2000*
Crystal River	3	2,976	8,340	0.066	819

Column A shows the ozone-season generation projected from the Crystal River Unit 3 under the final Transport Rule 2012 remedy modeling. Columns B and C show the capacity-weighted average heat rate and ozone-season NO_X emission rate from combined cycle natural gas units in Florida that EPA assumes would be likely to increase their dispatch to replace the generation that would otherwise be available from Crystal River Unit 3.[14] To characterize the emissions of this replacement generation, EPA selected combined cycle units that reported higher utilization in 2010 (when Crystal River Unit 3 was also out of service for repair) compared to their projected utilization under the final Transport Rule 2012 remedy modeling (that assumed Crystal River Unit 3 would operate). Because the originally projected operation of Crystal River Unit 3 did not include any NO_X emissions covered by the Transport Rule, the emissions from likely replacement generation calculated in column D determine the amount of the increase to the state's 2012 ozone-season NO_X budget.

The change to the ozone-season NO_X budget for Florida does not impact the percentage of the budget set aside for new units in Florida, which remains at 2%. The original and revised values for the state ozone-season NO_X budget, assurance level, and new unit set-aside are described in the table below.

[14] These capacity-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Final Revisions Rule" found in the docket for this rulemaking.

Table B.5.b.: Impact of Florida Ozone-Season NO_X Budget Revision – Assuming Crystal River Unit 3 Outage (tons)					
	Ozone-Season NO_X Budget	Assurance Level		Total Ozone Season NO_X New Unit Set-Aside*	
		% of Budget	Tons	% of Budget	Tons
2012 Initial	27,825	121%	33,668	2%	557
2012 Revised	28,644	-	-	2%	573

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

6) Arkansas

Plum Point Unit 1 in Arkansas commenced commercial operation on or after January 1, 2010. Such a date qualifies Plum Point Unit 1 as a "planned" new unit by the definition of that category described in the "Allowance Allocation Final Rule TSD" for the Transport Rule. However, in the final Transport Rule, EPA did not recognize Plum Point Unit 1as a new unit and therefore omitted its projected emissions in the determination of the ozone-season NO_X new unit set-aside for Arkansas. Because there were no other units identified as "planned" new units in Arkansas, that state's NUSA was set at the minimum value of 2%.[15] EPA is finalizing, as proposed, a revision to the calculation of the Arkansas ozone-season NO_X new unit set-aside to reflect the "new unit" status of Plum Point Unit 1. The calculations to quantify this revision are shown in the table below.

	Table B.6.a.: Calculation for Arkansas's NUSA	
A	Projected 2020 Ozone-Season NO_X Emissions from Plum Point (tons)	478
B	Arkansas Ozone Season NO_X State Budget (tons)	15,037
C	Plum Point's Emissions as a % of Arkansas State Budget (*A/B*)	3%
D	Base percentage for new unit set-aside	2%
E	Total New Unit Set-Aside (*C* + *D*)	5%

[15] As explained in the final Transport Rule, the minimum size of any state's new unit set-aside is this "base percentage" amount, to which "state-specific" percentages are added if the given state has projected emissions from "planned" new units (76 FR 48291).

Because Plum Point was the only "planned" new unit for the state of Arkansas, EPA divided its projected emissions into the state budget to derive the state-specific percentage for the new unit set-aside in Arkansas, which rounds to 3%. This value was added to the base percentage for new unit set-aside (2%). The resulting new unit set-aside percentage for ozone season NO_X in Arkansas is 5%. This change does not impact the state budget or assurance level in any way. However, the new unit set-aside changes by the levels shown below.[16]

Table B.6.b.: Impact of Ozone Season NO_X NUSA revision for Arkansas

	Initial %	Updated%	Initial tons	Revised tons*
New Unit Set-Aside	2%	5%	301	752
Existing Unit Allocation	98%	95%	14,736	14,285
Total	100%	100%	15,037	15,037

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

7) Texas (NUSA)

The Oak Grove Unit 2 in Texas commenced commercial operation on or after January 1, 2010. Such a date qualifies Oak Grove Unit 2 as a "planned" new unit by the definition of that category described in the "Allowance Allocation Final Rule TSD". However, in the final Transport Rule, EPA did not recognize Oak Grove Unit 2 as a new unit and therefore omitted its projected emissions in the determination of the new unit set-asides for Texas, which EPA then calculated to be set at 5%, 3%, and 3% for SO_2, annual NO_X, and ozone-season NO_X, respectively. EPA is finalizing, as proposed, a revision to the Texas new unit set-asides to reflect the "new unit" status of Oak Grove Unit 2. The calculations to quantify these revisions are shown in the table below.

[16] The increase to the new unit set-aside would necessarily change existing unit allowance allocations in order to maintain the state budget. To review the existing unit allowance allocations associated with this revision, please see the document entitled "Final Revisions Rule Unit-Level Allocations under the FIPs" found in the docket to this rulemaking.

Table B.7.: Calculation for Texas's NUSAs				
		SO_2	NO_X	Ozone Season NO_X
A	Projected 2020 Emissions from planned new fossil (tons)*	9,855	2,727	1,216
B	TX State Budget (tons)	294,471	134,970	64,418
C	Planned new unit emissions as a % of Texas's State Budget (*A/B*)	3%	2%	2%
D	Base percentage for new unit set-aside	2%	2%	2%
E	Total New Unit Set-Aside (*C+D*)	5%	4%	4%
*Revised to include emissions from Oak Grove Unit 2				

The impact of all revisions to Texas state budgets (and these revisions to the NUSAs) on the state's NUSAs and assurance levels are shown in Tables B.13.e.

8) <u>Wisconsin</u>

EPA is finalizing, as proposed, a revision to Wisconsin's 2014 SO_2 budget to correct for the assumption that FGD technology will be installed by 2014 for Weston Unit 3. In the final Transport Rule analysis, this unit was not modeled to build an FGD purely in response to the $2,300 per ton threshold informing Wisconsin's 2014 state SO_2 budget; instead, its FGD was added as an input assumption in the base case related to information suggesting that this control was already scheduled for installation. However, Wisconsin Department of Natural Resources (WDNR) has informed EPA that this assumption was erroneous. Therefore, EPA is finalizing, as proposed, a revision to the state's SO_2 emission budget for 2014 to reflect this unit operating without an FGD. This results in a 5,605 ton increase to the state's 2014 SO_2 budget. This unit was not originally assumed to have an FGD by 2012, so EPA is not finalizing any revision related to this unit for the state's 2012 SO_2 budget. The calculations to quantify this revision are shown in the table below.

Table B.8.a.: Calculation to Determine Wisconsin's SO_2 Budget Revision – Assuming no FGD at Weston Unit 3 in 2014 (1000 tons)				
		A	*B*	*C*
Plant Name	**Unit ID**	**Emissions from TR_Remedy Final_2014**	**Emissions from TR_Remedy Final_2012**	**Net Budget Revision**
Calculation				*B-A*
Weston	3	0.647	6.252	5.605

Columns A and B show Weston's Unit 3 SO_2 remedy case emissions in 2014 and 2012, respectively. In its modeling of the final Transport Rule remedy, EPA projected the same total heat input for Weston Unit 3 in both years. However, the total projected emissions are lower in 2014 because the FGD was assumed to be operating in that year. Because the projected heat input is constant at this unit between these years, EPA has calculated the difference between the projected emissions at this unit in 2012 (no FGD assumed, column B) and in 2014 (FGD assumed, column A) to determine the amount of the increase to Wisconsin's 2014 SO_2 budget related to this unit, shown in column C.

EPA is also finalizing, as proposed, a revision to Wisconsin's 2014 SO_2 budget related to scrubbers being installed at Columbia units 1 and 2. In the final Transport Rule analysis, EPA assumed these installations would be wet scrubbers; however, the Wisconsin Department of Natural Resources (WDNR) has informed EPA that they have been planned and approved as dry scrubbers instead. In its analysis of the final Transport Rule, EPA assumed SO_2 removal rates of 96% for new wet scrubbers and 92% for new dry scrubbers. Therefore, the projected emissions from these units reflected a higher SO_2 removal rate (and consequently lower emissions) than these units would be assumed to achieve with dry scrubber technology. In accordance with this revision, EPA is finalizing, as proposed, a 2,152 ton increase to the Wisconsin 2014 SO_2 emission budget. These units were not originally assumed to have FGD by 2012, so EPA is not finalizing any revision related to these units for the state's 2012 SO_2 budget.

Table B.8.b.: Calculation to Determine Wisconsin SO_2 Budget Revision - Assuming Dry FGD at Columbia in 2014 (1000 tons)

		A	*B*	*C*	*D*
Plant Name	**Unit ID**	**Emissions from TR_Remedy Final_2014 (assuming 96% removal)**	**Uncontrolled Emissions (assuming no FGD)**	**Revised Emissions (assuming 92% removal)**	**Net Budget Revision**
Calculation			*A/(1-0.96)*	*B *(1-0.92)*	*C-A*
Columbia	1	1.089	27.231	2.179	1.09
Columbia	2	1.063	26.572	2.126	1.063
Total		2.152	53.804	4.304	**2.152***
*Total reflects rounding of calculation performed for both units together					

Column A shows the Columbia units' projected emissions assuming 96% removal characteristic of a new wet scrubber. Column B shows a calculation of projected emissions at each unit if the previously assumed FGD removal hadn't occurred at all; these "uncontrolled emissions" are calculated in order to allow application of the revised FGD removal rate of 92% to these uncontrolled emissions, which yields the revised emission projection for each

unit in column C. The difference between this revised emission projection (dry scrubbers assumed, column C) and the remedy emission projection (wet scrubbers assumed, column A) determines the amount of the increase to the state's 2014 SO_2 budget (column D).

EPA is also finalizing, as proposed, a revision to Wisconsin's annual NO_X budget for 2012 and 2014 to correct for the assumption that an SCR will be in place at John P. Madgett Unit 1 in 2012 and 2014. There are currently no plans to have an SCR in place by 2014 at the unit. Therefore, EPA is revising the state's 2012 and 2014 annual NO_X budgets by 2,473 tons to reflect the operation of the unit without an SCR. The calculations to quantify this revision are shown in the table below. EPA also recognizes that this revised input assumption is relevant to the calculation of the state's ozone-season NO_X budget; EPA already included this revised assumption in its quantification of that budget when the Agency issued the Transport Rule SNFR (76 FR 87060).

Table B.8.c.: Calculation to Determine Wisconsin Annual NO_X Budget Revision - Assuming no SCR at J P Madgett

		A	*B*	*C*	*D*	*E*	*F*
Plant Name	Unit ID	Emissions from TR_Remedy Final_2012 (1000 tons)	Heat Input from TR_Remedy_Final_2012 (TBtu)	Remedy Emission Rate fromTR_Remedy_Final_2012 (lbs/MMBtu)	Revised Emission Rate (lbs/MMBtu)	Revised Emissions (1000 tons)	Net Budget Revision (1000 tons)
Calculation				*A*2/B*		*D x B/2*	*E - A*
J P Madgett	B1	0.588922429	23.55689678	0.05	0.26	3.062	2.473

Columns A, B, and C shows the emissions, heat input, and emission rate from the 2012 remedy modeling for the J P Madgett unit. Because no SCR is present, EPA is recalculating projected emissions at this unit using the emission rate shown for this units in EPA's analysis of the base case for the final Transport Rule, as found in the TR_Base_Case_Final for 2012 (column D). This annual NO_X emission rate reflects generation at this unit without the operation of the assumed SCR, which did not operate in the final Transport Rule base case because it was modeled as a "dispatchable" control that was not found to be economic to operate in that scenario.[17] The J P Madgett emission rate without operating an SCR (column D) multiplied by the remedy heat input (column B) yields the projected emissions from the unit if no SCR were assumed to be in place. The difference between the projected emissions when no SCR is in place (column E) and the projected emissions when an SCR is assumed (column A) determines the amount of the increase to the state's 2012 and 2014 annual NO_X budgets (column F).

The revisions to the SO_2 emission budget for Wisconsin results in a small change to the state's new unit set-aside percentage for SO_2. The reason for the change is that under the methodology established in the final Transport Rule, the state-specific portion of the NUSA is calculated as the percentage equal to

[17] See **"WebReady_ParsedFile_TR_Base_Case_Final_2012"** in the Transport Rule docket or on EPA's CSAPR website

the projected emissions from "planned units" divided by the state budget for the relevant pollutant. In the case of Wisconsin, the projected emissions from planned units remain unchanged, but the budget is increasing.[18] Because the numerator remains unchanged but the denominator is increasing, the total new unit set-aside percentage for SO_2 decreases. That is, a smaller percentage of the state emission budget is needed to cover emissions from "planned" new units, because the budget is larger. For Wisconsin, the budget revision decreases the NUSA percentage for SO_2 from 5% to 4% as a result. This is applying the same NUSA methodology that is used for every state in the final Transport Rule, and the change in percentage is simply an outgrowth of the state's budget revision. While this change in the NUSA percentage reduces the absolute number of allowances in the Wisconsin NUSA for SO_2 as compared to the amount under the final Transport Rule, the revised NUSA still contains more than enough allowances in 2012 and 2014 to cover projected emissions from "planned" new units in Wisconsin, with the remainder still available for "potential" new units to enter the programs during that time. The original and revised values for the state SO_2 budget, assurance level, and new unit set-aside are described in the table below.

Table B.8.d.: Impact of Wisconsin Budget Revisions – Assuming no FGD at Weston Unit 3, no SCR at JP Madgett, and dry FGD at Columbia (tons)

			Assurance Level		Total New Unit Set-Aside*	
	Program	Budget	% of Budget	Tons	% of Budget	Tons
2012 Initial	SO_2	79,480	118%	93,786	5%	3,974
2012 Revised	SO_2	79,480	-	-	4%	3,179
2014 Initial	SO_2	40,126	118%	47,349	5%	2,006
2014 Revised	SO_2	47,883	118%	56,502	4%	1,915
2012 Initial	Annual NO_X	31,628	118%	37,321	6%	1,898
2012 Revised	Annual NO_X	34,101	-	-	6%	2,046
2014 Initial	Annual NO_X	30,398	118%	35,870	6%	1,824
2014 Revised	Annual NO_X	32,871	118%	38,788	6%	1,972

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

[18] While this relationship is also true for annual NO_X, the revisions to Wisconsin's annual NO_X budget do not yield a different calculated NUSA percentage than the originally determined 6% under the final Transport Rule.

9) New York

EPA is finalizing, as proposed, an increase to the New York state annual NO_X, ozone-season NO_X, and SO_2 budgets to reflect the assumption of near-term operational constraints affecting specific units in New York City and Long Island. These revisions are based on three types of local operating constraints that apply to certain generators in New York City and Long Island, which are referred to here as the N-1-1 Contingency, the Minimum Oil Burn Rules, and local out-of-merit-order dispatch conditions. Each calculation of the near-term emission impact found to be associated with these constraints is documented below; the results are summarized in Table B.9.f.

N-1-1 Contingency

Certain parts of the Con Edison system in New York City are required to be designed and operated for the occurrence of a second contingency, also known as an N-1-1 contingency; these requirements are in addition to any requirements for the first (N-1) contingency on which the overall New York State power system is operated. The local rules that determine the operation and unit commitment for New York City are New York State Reliability Council (NYSRC) rules I-R1 through I-R4.[19] To meet the requirements of these rules, the New York Independent System Operator (NYISO) performs a supplemental commitment of units in the New York City zone. The rules require additional reserves from in-city combustion turbines (CTs), as well as unit commitment of steam units where needed to ensure sufficient locational reserves and to guard against a potential interruption in gas supply at any given facility that could disrupt its generation and perturb local grid stability. These rules are in effect throughout the year and are implemented by NYISO in a daily and hourly unit commitment process specific to New York City. Depending on the expected load level and the pattern of load during the day, NYISO will commit steam units to meet intermediate load levels, while placing CTs in reserve to meet morning and afternoon peak requirements if needed. As the NYISO must meet multiple requirements for reserves and energy and comply with the NYSRC rules, the exact pattern of dispatch that satisfies all of these constraints varies throughout the year. Because the steam units in the city have long startup times and 24-hour minimum run times, NYISO must commit these units in advance in order to preserve the ability to dispatch the CTs during peak load or in response to grid disruption contingencies.

The dispatch requirements apply throughout the year, but there are also additional environmental requirements unique to ozone season operation. During the ozone season, the NYISO determines generator operations subject to local environmental regulations that require NYISO to dispatch certain steam units before seeking additional power from CTs when needed, to balance the need to meet energy and reserve requirements against daily local emissions for these units. NYISO implements these requirements through an operational procedure that requires commitment of oil/gas steam units at specific plants that would otherwise not be economic to dispatch, in order to ensure these combustion turbines can be dispatched when needed. For the

[19] See Rule I-R1, *NYSRC Reliability Rules For Planning and Operating the New York State Power System*, Version 29, New York State Reliability Council (NYSRC), January 7, 2011, p. 66.

steam units in New York City (Arthur Kill, Ravenswood and Astoria), these procedures mean that one or more steam units must be running for the entire ozone season.[20]

Minimum Oil Burn Rules

In order to ensure that units do not go offline if there is a loss of natural gas supply to New York City, the NYSRC rules incorporate special provisions that require natural gas units to be prepared to switch from natural gas to oil immediately upon notice of a loss of natural gas supply. These provisions are implemented through utility applications to the NYISO for special summer and winter dispatch conditions designed to govern when generators must be prepared to burn oil in each season.[21] For certain oil/gas steam units that do not have the ability to switch immediately from natural gas to oil, this provision means that they must already be burning oil at the times that they may be notified to switch. As a result, it is necessary for these units to operate using oil at certain times of the year. For New York City, Con Edison applies to revise this procedure twice each year based on expected conditions for the winter or summer season.[22] There is a separate and similar minimum oil burn rule affecting units in Long Island.[23]

Since in the current outlook the price of oil is much higher than gas for the same heat input, EPA recognizes that these operations would not be captured in projections of economic generating behavior. As such, EPA has calculated revised emission projections at the units affected by the minimum oil burn rules based on the fraction of heat input each unit reported as oil in 2010 to the Energy Information Administration.[24]

Local Out-of–Merit-Order Dispatch

Long Island's ability to import electricity is limited to tie lines within the state between Con Ed and the Long Island Power Authority (LIPA), and interstate cables connecting Long Island with the Independent System Operator for New England (ISO-NE) and the PJM Interconnection. Because the lines from ISO-NE and PJM are direct current (DC) lines that are not dispatched in real time and not controlled by the NYISO, the ability to serve Long Island load from within New York State is subject to overall import limitations. Local conditions limiting the immediate-term ability of NYISO to move power between southern New York state and Long Island lead NYISO to dispatch more generation from units on Long Island than regional economic dispatch modeling, such as EPA's IPM projections, would suggest. The NYISO Operating Study[25] shows that NYISO is limited to approximately 860 MW of dispatchable import capacity into Long Island on a sustainable hourly basis. Even if this line were fully loaded for all hours of the year, the maximum amount of imports into Long Island that NYISO can dispatch would be 7.5 TWh; however, in EPA's modeling of the final Transport Rule, Long Island has

[20] See *Analysis of New York City Averaging Plans for Compliance with NOx Emissions Limitations*, New York Independent System Operator, Inc., 2011
[21] *NYSRC Reliability Rules For Planning and Operating the New York State Power System*, Version 29, New York State Reliability Council (NYSRC), January 7, 2011, I-R3 & I-R5 Reliability Rule Applications. Rule I-R3 governs New York City operations, Rule I-R5 Long Island Operations.
[22] See ConEd, *Application for the Loss of Generator Gas Supply – New York City, OC Meeting – May 12, 2011*, for the requirements for the summer 2011 procedures.
[23] See the document, *Long Island Gas Burn Procedures – 2011*, in the docket for the TR Rule Revisions Proposal, Docket.
[24] The EIA data used for this calculation is available at: http://www.eia.gov/cneaf/electricity/page/eia906_920.html.
[25] See NYISO Operating Study Summer 2011 and Appendices, New York Independent System Operator, July 14, 2011, page C-3.

9.7 TWh of net imports from NYISO dispatch. Under these conditions, NYISO would have to increase local Long Island generation by 2.2 TWh to meet local load while respecting the 7.5 TWh limitation on imports from the rest of NYISO, notwithstanding the economic merit of that imported generation. To determine projected emissions associated with this local out-of-merit-order dispatch, EPA assumed that this generation would come from the Northport plant, on the basis that one unit at Northport is modeled to have economic generation even without this local import limitation represented, and the remaining units at Northport have heat rates that differ by less than one percent from the Northport unit that was modeled to dispatch.

Calculation of New York City Revised Generation and Emissions – Plant Level

To reflect the requirements of the NYSRC rules as implemented by the NYISO for New York City, EPA is assuming that additional commitment of units at three steam plants in New York City (Arthur Kill, Ravenswood, and Astoria) would occur in the form of two units at each facility dispatched at a minimum of 50% capacity at the times that the contingency conditions apply to necessitate non-economic operation of these steam units. These calculations establish the assumed minimum generation at each facility that would dispatch in the immediate term to meet the conditions of the NYSRC rules independent of the economic merit of that generation within the larger region as originally modeled. Where EPA's originally projected generation for the unit was less than this minimum, EPA has calculated here the difference in generation from the unit and, most importantly, the associated emissions from that generation, in order to inform the revision to the New York state budgets under the Transport Rule. Calculations were performed separately for ozone season and non-ozone season periods. During the ozone season, these dispatch conditions were assumed to apply 100% of the time; during the rest of the year (non-ozone season), they were assumed to apply 40% of the time, reflecting historically observed seasonal differences in operation of these units. The NO_X emissions from this additional generation at these units were calculated using each unit's heat rate and NO_X emission rate from EPA's assumptions in its IPM modeling. The results from these unit-level calculations are shown in Tables B.9.a and B.9.b.

To account for the effects of the minimum oil burn rule in New York City, EPA calculated SO_2 emissions from the revised generation at each unit by assuming that the unit would burn oil for the same share of its projected heat input (including the revisions discussed above) as reported to EIA in 2010. These calculations for New York City units are shown in Table B.9.b. To estimate additional SO_2 emissions, the IPM emission rate of 1.04 lbs/MMBtu for residual fuel oil was used. The IPM emission rate for NO_X is the same for natural gas and oil, so no changes in NO_X emissions were needed to represent the additional use of oil.

Table B.9.a.: Ozone Season NO_X Revised Unit-Level Emission Projections for New York City for N-1-1 Contingency Operation											
Affected Facilities		**Operations as modeled for the Transport Rule in IPM**						**Revisions to Generation and Emissions**			
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*
UniqueID	**Plant Name**	**Capacity (MW)**	**Capacity Factor**	**Heat Rate (BTU/ kWh)**	**NO_X Rate (lbs/ MMBtu)**	**Heat Input (TBtu)**	**Generation (GWh)**	**Minimum Capacity Factor**	**Revised Generation (GWh)**	**Additional Generation beyond IPM (GWh)**	**Additional NO_X Emissions (tons)**
Calculation										*(I-H)*	*(E*J*F)/ 2000*
2490_B_20	Arthur Kill	335	31.7%	10389	0.08	4.056	390	50.0%	615	225	90.5
2490_B_30	Arthur Kill	491	31.7%	10198	0.10	5.836	572	50.0%	901	329	165.6
2500_B_10	Ravenswood	356	0.0%	11714	0.07	0.000	0	50.0%	653	653	256.5
2500_B_30	Ravenswood	940	0.0%	11624	0.07	0.000	0	50.0%	1,726	1,726	697.7
8906_B_30	Astoria	366	44.4%	10123	0.06	6.039	597	50.0%	672	75	23.3
8906_B_40	Astoria	373	44.4%	10117	0.06	6.150	608	50.0%	685	77	23.8

Table B.9.b.: Annual NO_X and SO_2 Revised Unit-Level Emission Projections for New York City for N-1-1 Contingency Operation and Minimum Oil Burn Rule

Affected Facilities		Operations as modeled for the Transport Rule in IPM						Revisions to Generation and Emissions					
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*
Unique ID	**Plant Name**	**Capacity (MW)**	**Capacity Factor**	**Heat Rate (BTU/ kWh)**	**NO_X Rate (lbs/ MMBtu)**	**Heat Input (TBtu)**	**Generation (GWh)**	**Minimum Capacity Factor**	**Revised Generation (GWh)**	**Additional Generation beyond IPM (GWh)**	**Additional NO_X Emissions (tons)**	**2010 Oil Fraction**	**Additional SO_2 Emissions (tons)***
Calculation										*(I-H)*	*(E*J*F)/ 2000*		*M*J*1.04* E/2000*
2490_ B_20	Arthur Kill	335	13.3%	10389	0.08	4.056	390	32.6%	956	566	227.9	0.000	0.0
2490_ B_30	Arthur Kill	491	13.3%	10198	0.10	5.836	572	32.6%	1,401	829	416.9	0.000	0.0
2500_ B_10	Ravens-wood	356	0.0%	11714	0.07	0.000	0	32.6%	1,015	1,015	398.7	0.039	243.1
2500_ B_30	Ravens-wood	940	0.0%	11624	0.07	0.000	0	32.6%	2,682	2,682	1084.4	0.039	637.7
8906_ B_30	Astoria	366	18.6%	10123	0.06	6.039	597	32.6%	1,044	448	138.6	0.065	358.3
8906_ B_40	Astoria	373	18.6%	10117	0.06	6.150	608	32.6%	1,064	456	141.1	0.065	364.9
8906_ B_50	Astoria	359	18.6%	10120	0.06	5.921	585	18.6%	585	0	0.0	0.065	200.7

*Assumes the IPM v.4.10_FTransport SO_2 emission rate of 1.04 lbs/MMBTU for oil-fired generation

Calculation of Long Island Revised Generation and Emissions – Plant Level

As discussed above, EPA is assuming that an additional 2.2 TWh of generation beyond the level projected in IPM modeling of the Transport Rule will occur on Long Island in the immediate term to allow NYISO to dispatch enough power to meet local load while respecting the limited import capacity into Long Island. EPA is assuming that this additional generation would occur at the Northport facility distributed across its three units. Since the three units have virtually identical heat rates, EPA assumes that these units would be operated at the same capacity factors; EPA therefore establishes a minimum capacity factor at each unit in order to produce an additional 2.2 TWh beyond the original IPM projection. In concert with these assumptions, EPA calculated additional ozone-season NO_X, annual NO_X, and SO_2 emissions from these Long Island units in the same way as for the New York City units shown above. These calculations are provided in Tables B.9.c and B.9.d below.

Table B.9.c.: Ozone Season NO_X Revisions for Long Island for Import Limited Generation											
Affected Facilities		**Operations as modeled for the Transport Rule in IPM**						**Revisions to Generation and Emissions**			
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*
UniqueID	**Plant Name**	**Capacity (MW)**	**Capacity Factor**	**Heat Rate (BTU/ kWh)**	**NO_X Rate (lbs/ MMBtu)**	**Heat Input (TBtu)**	**Generation (GWh)**	**Minimum Capacity Factor**	**Required Generation (GWh)**	**Additional Generation (GWh)**	**Additional NO_X Emissions (tons)**
Calculation										*(I-H)*	*(E*J*F)/ 2000*
2516_B_2	Northport	390	23.4%	10580	0.11	3.534	334	38.5%	551	217	129.6
2516_B_3	Northport	391	0.0%	10634	0.14	0.000	0	38.5%	552	552	399.0
2516_B_4	Northport	385	0.0%	10663	0.10	0.000	0	38.5%	544	544	292.2

Table B.9.d.: Annual NO_X and SO_2 Revisions for Long Island for Import Limited Generation and Minimum Oil Burn Rule													
Affected Facilities		**Operations as modeled for the Transport Rule in IPM**						**Revisions to Generation and Emissions**					
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*
Unique ID	**Plant Name**	**Capacity (MW)**	**Capacity Factor**	**Heat Rate (BTU/ kWh)**	**NO_X Rate (lbs/ MMBtu)**	**Heat Input (TBtu)**	**Generation (GWh)**	**Minimum Capacity Factor**	**Revised Generation (GWh)**	**Additional Generation beyond IPM (GWh)**	**Additional NO_X Emissions (tons)**	**2010 Oil Fraction**	**Additional SO_2 Emissions (tons)***
Calculation										*(I-H)*	*(E*J*F)/ 2000*		*M*J*1.04* E/2000*
2516_B_2	Northport	390	9.8%	10580	0.11	3.534	334	25.1%	858	524	313.4	0.122	573.7
2516_B_3	Northport	391	0.0%	10634	0.14	0.000	0	25.1%	860	860	621.6	0.122	578.1
2516_B_4	Northport	385	0.0%	10663	0.10	0.000	0	25.1%	847	847	455.2	0.122	570.8
Assumes the IPM v.4.10_FTransport SO_2 emission rate of 1.04 lbs/MMBTU for oil-fired generation													

Calculation of Revisions to New York State Budgets

In order to maintain the balance of electricity supply and demand as originally projected in the Transport Rule analysis, EPA is assuming that increased generation at the units shown above would offset the need for an equivalent amount of generation originally projected in IPM to occur at more efficient generators in the system. To calculate the net change in projected emissions for each pollutant relevant to establishing state budgets under the Transport Rule, EPA assumes that the increased generation at the units shown above displaces previously projected generation from a combined cycle unit in New York City, as that unit is representative of more efficient generation that is preferred in IPM determinations of least-cost dispatch. These calculations are shown in Table B.9.e.

Table B.9.e.: Calculation of Emissions from Displaced Generation at a Representative Combined Cycle Unit in New York*

	A	*B*	*C*	*D*
Program Period	**Displaced Generation (GWh)**	**Heat Rate (BTU/kWh)**	**NO_X Emission Rate (lbs/MMBTU)**	**Displaced NO_X Emissions (tons)**
Calculation				*A*B*C/2000*
Annual	8,227	7,600	0.01	313
Ozone Season	4,397	7,600	0.01	167

*Assumed heat rate and emission rates are taken from the 500 CC unit in New York City, as shown in NEEDS v4.10_FTransport.

To quantify the revisions to Transport Rule state budgets in New York, EPA has calculated the net emissions change associated with the revisions to unit-level generation presented in this section, including the displaced emissions shown in Table B.9.e. These calculations are shown in Table B.9.f.

Table B.9.f.: Calculation to Determine Net New York SO_2, Annual NO_X, and Ozone Season NO_X Budget Revisions				
		SO_2	**Annual NO_X**	**Ozone Season NO_X**
A	Additional Emissions Due to New York City Revisions	1,805	2,408	1,257
B	Additional Emissions Due to Long Island Revisions	1,723	1,390	821
C	Displaced Emissions	0	313	167
D	**Net Emissions Change For New York (A+B-C)**	**3,527**	**3,485**	**1,911**

The revisions to the annual and ozone season NO_X emission budgets for New York result in small changes to the state's new unit set-aside percentages for annual NO_X and ozone season NO_X. The reason for these changes is that under the methodology established in the final Transport Rule, the state-specific portion of the NUSA is calculated as the percentage equal to the projected emissions from "planned units" divided by the state budget for the relevant pollutant. In the case of New York, the projected emissions from planned units remain unchanged, but the budgets are increasing.[26] Because the numerator remains unchanged but the denominator is increasing, the total new unit set-aside percentage for annual NO_X and ozone season NO_X decreases. That is, a smaller percentage of the state emission budgets is needed to cover emissions from "planned" new units, because the budgets are larger. For New York, the budget revisions decrease the NUSA percentages for both annual NO_X and ozone season NO_X from 3% to 2% as a result. This is applying the same NUSA methodology that is used for every state in the final Transport Rule, and the change in percentages is simply an outgrowth of the state's budget revisions. Despite the lower percentage value, the absolute number of allowances in the New York NUSAs rises in accordance with the budget revisions for New York. The original and revised values for the state's emission budgets, assurance levels, and new unit set-asides are described in the Table B.9.g below.

[26] While this relationship is also true for SO_2, the revisions to New York's SO_2 budget do not yield a different calculated NUSA percentage than the originally determined 2% under the final Transport Rule.

Table B.9.g.: Impact of New York Budget Revisions – Assuming Out-of-Merit-Order Dispatch at New York City and Long Island Units (tons)						
			Assurance Level		Total New Unit Set-Aside*	
	Program	Budget	% of Budget	Tons	% of Budget	Tons
2012 Initial	SO_2	27,325	118%	32,244	2%	547
2012 Revised	SO_2	30,852	-	-	2%	617
2014 Initial	SO_2	18,585	118%	21,930	2%	372
2014 Revised	SO_2	22,112	118%	26,092	2%	442
2012 Initial	Annual NO_X	17,543	118%	20,701	3%	351
2012 Revised	Annual NO_X	21,028	-	-	2%	421
2014 Initial	Annual NO_X	17,543	118%	20,701	3%	351
2014 Revised	Annual NO_X	21,028	118%	24,813	2%	421
2012 Initial	Ozone-Season NO_X	8,331	-	-	3%	167
2012 Revised	Ozone-Season NO_X	10,242	121%	12,393	2%	205
2014 Initial	Ozone-Season NO_X	8,331	121%	10,081	3%	167
2014 Revised	Ozone-Season NO_X	10,242	121%	12,393	2%	205

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

10) <u>New Jersey</u>

EPA is finalizing, as proposed, an increase to New Jersey's SO_2, annual NO_X, and ozone season NO_X budgets to correct for the assumption that scrubber and SCR technology would be installed by 2012 at BL England Unit 1. The scrubber and SCR had been planned to meet an Administrative Consent Order (AO) with New Jersey, but an agreement with the state allowed for a delay in installation of the control technology until the end of 2013. Additionally, the AO requires that this unit only run during the ozone season.[27] Therefore, EPA is adjusting the state's 2012 emission budgets to reflect this

[27] Personal Correspondence from Bill O'Sullivan, New Jersey Department of Environmental Protection, to Sam Napolitano. September 26, 2011.

unit operating only in the ozone season and without a scrubber or SCR. This results in a 2,096 ton increase to the state's 2012 SO_2 budget; a 273 ton increase to the state's 2012 annual NO_X budget; and a 397 ton increase to the state's 2012 ozone season NO_X budget. As discussed later in this section, EPA assumes that the generation previously projected at BL England Unit 1 outside of the ozone season (and thus inconsistent with the AO) would occur instead at well-controlled combined cycle units within the state, and their associated emissions are factored into the revisions to New Jersey state budgets.

The calculations of revised 2012 emissions from ozone-season operation of BL England Unit 1 are shown in Table B.10.a.

Table B.10.a.: Calculation to Determine Revised Ozone Season Emissions at BL England Unit 1

	A	*B*	*C*	*D*	*E*	*F*
Pollutant	**Ozone Season Emissions from TR_Remedy Final_2012 (1000 tons)**	**Ozone Season Heat Input from TR_Remedy_Final_2012 (TBtu)**	**Remedy Emission Rate from TR_Remedy_Final_2012 (lbs/MMBtu)**	**Revised Emission Rate (lbs/MMBtu)**	**Revised Ozone Season Emissions (1000 tons)**	**Net Change in Ozone Season Emissions (1000 tons)**
Calculation			*A*2/B*		*D x B/2*	*E - A*
SO_2	0.175	2.282	0.153	2.190	2.499	2.324
NO_X	0.105	2.282	0.092	0.440	0.502	0.397

Columns A, B, and C show the emissions, heat input, and emission rate from the TR_Remedy_Final_2012 modeling when the pollution control devices were originally assumed to be present at BL England Unit 1. Because neither a scrubber nor SCR is required by the AO in 2012, EPA modified the emission rates by removing the impact of the scrubber[28] and adopting the "controlled NO_X policy rate" in the NEEDS version from the September 1, 2010 TR Notice of Data Availability (NODA), which does not reflect operation of an SCR at that unit (column D).[29] These values approximate the emission rates expected at the unit at a cost threshold of $500/ton when no scrubber or SCR is present at the unit. These emission rates were multiplied by the remedy heat input shown in column B to obtain a revised emissions value for the unit (column E). The difference between these revised emission projections (no scrubber or SCR assumed, column E) and the remedy emission projections (scrubber and SCR assumed, column A) determines the net change to this unit's ozone-season emissions (column F).

[28] The SO_2emission rate for BL England Unit 1 in TR_Remedy Final_2012 was 0.153 lbs/MMBtu. Removing the impact of that previously assumed scrubber's SO_2 removal rate of 93% yields an uncontrolled SO_2 emission rate of 2.19 lbs/MMBtu.

[29] See National Electric Energy Data System (NEEDS) v4.10 available at http://www.epa.gov/airmarkets/progsregs/epa-ipm/BaseCasev410.html

Since the AO does not allow BL England Unit 1 to run outside of the ozone season, EPA has also determined the emissions impact from replacing the previously projected generation for that unit occurring outside of the ozone season. EPA assumes that this decrease in previously projected generation at BL England Unit 1 would be offset by increasing generation at New Jersey combined cycle units,[30] represented in these calculations as a generic unit with a heat rate and emission rates equal to the generation-weighted average of New Jersey combined cycle units.[31] The calculations of emissions from this replaced generation are shown in Table B.10.b. As discussed below, the heat and emission rates of the generic unit were revised from the proposal for consistency across all revisions using a generation weighted average, instead of capacity weighted. Additionally, two cogeneration plants were removed from this average based on comments.

Table B.10.b.: Calculation of Emissions at New Jersey Combined Cycle Units from Replacing BL England Unit 1's Non-Ozone-Season Generation

	A	*B*	*C*	*D*
Pollutant	**BL England Unit 1 Non-Ozone Season Generation from TR_Remedy Final_2012 (GWh)**	**Average Heat Rate of Replacement Generation (Btu/kWh)**	**Emission Rate of Replacement Generation (lbs/MMBtu)**	**Emissions from Replacement Generation (1000 tons)**
Calculation				*A*B*C/(2000*1000)*
SO_2	253.3	7413	0	0
NO_X	253.3	7413	0.0136	0.013

EPA calculated the SO_2 and NO_X emissions in Table B.10.b by multiplying the replaced generation (column A) by the generic unit's heat rate (column B) and relevant emission rate (column C).

In order to calculate appropriate revisions to New Jersey's 2012 SO_2, annual NO_X, and ozone season NO_X state budgets in accordance with the revisions to BL England Unit 1, EPA calculated the net change in projected emissions of each pollutant as shown in Table B.10.c below.

[30] Excluding cogeneration facilities, whose generation is not solely based on electricity demand.

[31] These generation-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Final Revisions Rule" found in the docket for this rulemaking.

Table B.10.c.: Calculation to Determine New Jersey 2012 Budget Revisions Due to Changes at BL England Unit 1 (1000 tons)			
	Quantity	***Calculation***	**Value**
A	Additional SO_2 Emissions from BL England		2.324
B	SO_2 Emissions from Replacement Generation		0
C	BL England Unit 1 Non-Ozone Season SO_2 Emissions from TR_Remedy Final_2012		0.228
D	**Net SO_2 Emissions Due to Revisions of BL England Unit 1**	***A+B-C***	**2.096**
E	Additional Ozone Season NO_X Emissions from BL England		0.397
F	Annual NO_X Emissions from Replacement Generation		0.013
G	BL England Unit 1 Non-Ozone Season NO_X Emissions from TR_Remedy Final_2012		0.137
H	**Net Annual NO_X Emissions Due to Revisions of BL England Unit 1**	***E+F-G***	**0.273**
I	**Net Ozone Season NO_X Emissions Due to Revisions of BL England Unit 1**	***=E***	**0.397**

The revisions to New Jersey's 2012 SO_2 and annual NO_X budgets are determined by combining the revised emissions from ozone season operation without FGD or SCR at BL England Unit 1 (rows A and E) with the net change in emissions from replacing BL England's generation during the rest of the year (row B minus row C for SO_2, row D minus row E for NO_X). The revision to New Jersey's 2012 ozone-season NO_X budget is equivalent to the change in ozone season NO_X emissions at BL England due to removing the SCR (row E).

EPA is also finalizing, as proposed, an increase to New Jersey's annual NO_X and ozone season NO_X budgets to reflect the assumption of near-term operational constraints affecting six plants, based on information provided by the system operator demonstrating that northern New Jersey is an out-of-merit-order dispatch area. EPA's analysis in the final Transport Rule did not incorporate the immediate-term local conditions described in recently submitted documentation that appear likely to necessitate non-economic generation at the units displayed below during the implementation of the Transport Rule programs. Specifically, EPA is assuming additional generation will be dispatched at six plants (Bergen, Edison, Essex, Kearny, Linden, and Sewaren Generating Stations) based on the average capacity factor representing the frequency the unit has recently been called on to operate out of merit order,

calculated from dispatch logbook data provided by PSEG.[32] As discussed later in this section, EPA assumes that the additional generation dispatched from these six facilities would offset generation that would otherwise come from combined cycle units within the state, and the revisions to New Jersey state budgets are based on the net change to projected emissions taking that offsetting factor into account. The net impact of these changes on the state's 2012 and 2014 budgets are a 679 ton increase in annual NO_X and a 349 ton increase in ozone season NO_X.

The calculations of the increase in ozone season NO_X and annual NO_X emissions due to out-of-merit-order dispatch at the six facilities are shown in Tables B.10.d and B.10.e, respectively. For each unit with out-of-merit-order dispatch, the capacity, 2012 emissions from TR_Remedy Final_2012, heat rate, generation, and emission rate are shown (columns A to G). The average out-of-merit-order capacity factor is shown in column H. The additional generation for out-of-merit-order dispatch was calculated by multiplying the capacity, the average out-of-merit-order capacity factor, and the number of hours in either the ozone season or year (column I). The additional heat input required was calculated by multiplying the incremental generation by the unit's heat rate (column J). Finally, the additional emissions associated with the out-of-merit-order generation was calculated by multiplying the additional heat input by the unit's NO_X emission rate.

Table B.10.d.: Calculation to Determine New Jersey Ozone Season NO_X Budget Revisions - Assuming Out-of-Merit-Order Dispatch at Six Plants

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique ID**	**Capacity (MW)**	**2012 Ozone Season NO_X Emission from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Ozone Season Generation from TR_Remedy Final_2012 (GWh)**	**NO_X Emission Rate from TR_Remedy Final_2012 (lbs/MMBtu)**	**Ozone Season Average Out-Of-Merit-Order Capacity Factor**	**Additional Ozone Season Generation (GWh)***	**Additional Ozone Season Heat Input (MMBtu)**	**Additional Ozone Season NO_X Emissions (tons)**
Calculation								*C*H*3.672*	*E*I*	*G*J/2000*
Bergen	2398_G_1101	114	0.010	8841	55.18	0.04	20.1%	84.16	744,050	15.6
Bergen	2398_G_1201	114	0.010	8841	55.18	0.04	20.1%	84.16	744,050	15.6
Bergen	2398_G_1301	114	0.010	8841	55.18	0.04	20.1%	84.16	744,050	15.6

[32] See the spreadsheet *"New Jersey Minimum Noneconomic Dispatch"* provided by PSEG on September 26, 2011, in the docket for this rule making.

Bergen	2398_G_1401	114	0.010	8841	55.18	0.04	20.1%	84.16	744,050	15.6
Bergen	2398_G_1501	219	0.020	8841	106.00	0.04	20.1%	161.67	1,429,359	30.0
Bergen	2398_G_2101	163	0.004	9241	78.89	0.01	22.0%	131.73	1,217,340	7.3
Bergen	2398_G_2201	163	0.004	9241	78.89	0.01	22.0%	131.73	1,217,340	7.3
Bergen	2398_G_2301	224	0.006	9241	108.42	0.01	22.0%	181.03	1,672,908	10.0
PSEG Edison	2400_G_11	42	0.003	16763	1.37	0.27	2.1%	3.29	55,100	7.4
PSEG Edison	2400_G_12	42	0.003	16862	1.37	0.27	2.1%	3.17	53,375	7.1
PSEG Edison	2400_G_13	42	0.003	16893	1.37	0.27	1.8%	2.79	47,161	6.3
PSEG Edison	2400_G_14	42	0.003	16947	1.37	0.26	1.7%	2.60	44,143	5.8
PSEG Edison	2400_G_21	42	0.003	17182	1.37	0.28	2.0%	3.04	52,261	7.2
PSEG Edison	2400_G_22	42	0.003	16846	1.37	0.27	2.0%	3.07	51,731	6.9
PSEG Edison	2400_G_23	42	0.003	16979	1.37	0.27	1.9%	2.87	48,679	6.6
PSEG Edison	2400_G_24	42	0.004	17184	1.37	0.30	1.6%	2.53	43,451	6.5
PSEG Edison	2400_G_31	42	0.003	16953	1.37	0.27	1.6%	2.52	42,653	5.7
PSEG Edison	2400_G_32	42	0.003	16984	1.37	0.27	1.8%	2.76	46,909	6.3
PSEG Edison	2400_G_33	42	0.003	17033	1.37	0.27	1.9%	2.87	48,964	6.6
PSEG Edison	2400_G_34	42	0.003	16950	1.37	0.26	1.7%	2.68	45,443	6.0
PSEG Essex	2401_G_101	42	0.003	16968	1.37	0.30	2.6%	4.00	67,800	10.2

PSEG Essex	2401_ G_102	42	0.004	17066	1.37	0.30	2.4%	3.66	62,382	9.3
PSEG Essex	2401_ G_103	42	0.004	17188	1.37	0.30	2.1%	3.31	56,950	8.5
PSEG Essex	2401_ G_104	42	0.004	17167	1.37	0.30	2.2%	3.33	57,220	8.6
PSEG Essex	2401_ G_111	46	0.004	16816	1.50	0.30	2.5%	4.16	69,880	10.5
PSEG Essex	2401_ G_112	46	0.004	17154	1.50	0.30	2.6%	4.48	76,769	11.5
PSEG Essex	2401_ G_113	46	0.004	16847	1.50	0.30	2.3%	3.92	66,007	9.9
PSEG Essex	2401_ G_114	46	0.004	16726	1.50	0.30	2.3%	3.86	64,566	9.7
PSEG Essex	2401_ G_121	46	0.004	16455	1.50	0.30	2.2%	3.80	62,517	9.4
PSEG Essex	2401_ G_122	46	0.004	16889	1.50	0.30	2.2%	3.78	63,867	9.6
PSEG Essex	2401_ G_123	46	0.004	16771	1.50	0.30	2.3%	3.83	64,166	9.6
PSEG Essex	2401_ G_124	46	0.001	16758	1.50	0.08	2.2%	3.67	61,540	2.6
PSEG Essex	2401_ G_9	81	0.022	10633	13.67	0.30	0.0%	0.00	0	0.0
PSEG Kearny	2404_ G_10	134	0.012	18700	4.45	0.30	0.5%	2.37	44,361	6.7
PSEG Kearny	2404_ G_11	134	0.012	18700	4.45	0.30	0.3%	1.47	27,572	4.1
PSEG Kearny	2404_ G_N121	43.8	0.003	9667	7.28	0.09	0.2%	0.26	2,534	0.1
PSEG Kearny	2404_ G_N122	43.7	0.003	9791	7.26	0.09	0.2%	0.27	2,670	0.1
PSEG Kearny	2404_ G_N123	43.8	0.003	10109	7.28	0.09	0.0%	0.02	201	0.0
PSEG Kearny	2404_ G_N124	43.7	0.003	9704	7.26	0.09	0.2%	0.26	2,475	0.1

PSEG Linden	2406_ G_5	86	0.005	12110	14.51	0.06	2.1%	6.58	79,681	2.4
PSEG Linden	2406_ G_6	86	0.005	12601	14.51	0.05	2.1%	6.60	83,206	2.1
PSEG Linden	2406_ G_7	84	0.005	12155	14.17	0.06	2.5%	7.83	95,173	2.8
PSEG Linden	2406_ G_8	84	0.006	13314	14.17	0.06	2.6%	8.03	106,922	3.4
PSEG Sewaren	2411_ B_1	104	-	12377	0.00	0.12	6.4%	24.28	300,531	17.6
PSEG Sewaren	2411_ B_2	118	-	13581	0.00	0.16	4.7%	20.31	275,884	22.1
PSEG Sewaren	2411_ B_3	107	-	14500	0.00	0.15	6.0%	23.73	344,085	26.1
PSEG Sewaren	2411_ B_4	124	-	14500	0.00	0.14	3.8%	17.38	251,965	17.6
TOTAL								**1,142**	**11,483,943**	**410.2**

*The formula used to calculate Column I uses a multiplier of 3.672 because there are 3,672 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.

Table B.10.e.: Calculation to Determine New Jersey Annual NO_X Budget Revisions - Assuming Out-of-Merit-Order Dispatch at Six Plants

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**NEEDS Unique ID**	**Capacity (MW)**	**2012 Annual NO_X Emission (1000 tons) from TR_Remedy Final_2012**	**Heat Rate from TR_Remedy Final_2012 (Btu/kWh)**	**GWh Annual from TR_Remedy Final_2012**	**NO_X Emission Rate from TR_Remedy Final_2012 (lbs/MMBtu)**	**Annual Average Out-Of-Merit-Order Capacity Factor**	**Additional Annual Generation (GWh)***	**Additional Annual Heat Input (MMBtu)**	**Additional Annual NO_X Emissions (tons)**
Calculation								**C*H*8.760**	**E*I**	**G*J/2000**
Bergen	2398_G_1101	114	0.015	8841	78.98	0.04	36.3%	362.43	3,204,207	67.3
Bergen	2398_G_1201	114	0.015	8841	78.98	0.04	36.3%	362.43	3,204,207	67.3
Bergen	2398_G_1301	114	0.015	8841	78.98	0.04	36.3%	362.43	3,204,207	67.3
Bergen	2398_G_1401	114	0.015	8841	78.98	0.04	36.3%	362.43	3,204,207	67.3
Bergen	2398_G_1501	219	0.028	8841	151.72	0.04	36.3%	696.24	6,155,451	129.3
Bergen	2398_G_2101	163	0.005	9241	86.87	0.01	35.5%	507.55	4,690,299	28.1
Bergen	2398_G_2201	163	0.005	9241	86.87	0.01	35.5%	507.55	4,690,299	28.1
Bergen	2398_G_2301	224	0.007	9241	119.38	0.01	35.5%	697.50	6,445,565	38.7
PSEG Edison	2400_G_11	42	0.003	16763	1.37	0.27	1.0%	3.76	63,093	8.5
PSEG Edison	2400_G_12	42	0.003	16862	1.37	0.27	1.0%	3.56	59,944	8.0
PSEG	2400_	42		16893		0.27	0.8%	2.85	48,155	6.5

Edison	G_13		0.003		1.37					
PSEG Edison	2400_ G_14	42	0.003	16947	1.37	0.26	0.7%	2.67	45,259	6.0
PSEG Edison	2400_ G_21	42	0.003	17182	1.37	0.28	1.0%	3.59	61,750	8.5
PSEG Edison	2400_ G_22	42	0.003	16846	1.37	0.27	1.0%	3.60	60,655	8.1
PSEG Edison	2400_ G_23	42	0.003	16979	1.37	0.27	0.8%	3.02	51,338	7.0
PSEG Edison	2400_ G_24	42	0.004	17184	1.37	0.30	0.7%	2.68	46,125	6.9
PSEG Edison	2400_ G_31	42	0.003	16953	1.37	0.27	0.8%	2.88	48,831	6.5
PSEG Edison	2400_ G_32	42	0.003	16984	1.37	0.27	0.8%	3.10	52,620	7.1
PSEG Edison	2400_ G_33	42	0.003	17033	1.37	0.27	0.8%	2.94	50,000	6.7
PSEG Edison	2400_ G_34	42	0.003	16950	1.37	0.26	0.7%	2.74	46,491	6.1
PSEG Essex	2401_ G_101	42	0.003	16968	1.37	0.30	1.6%	6.07	102,945	15.4
PSEG Essex	2401_ G_102	42	0.004	17066	1.37	0.30	1.5%	5.39	91,989	13.8
PSEG Essex	2401_ G_103	42	0.004	17188	1.37	0.30	1.3%	4.79	82,370	12.3
PSEG Essex	2401_ G_104	42	0.004	17167	1.37	0.30	1.4%	5.21	89,408	13.4
PSEG Essex	2401_ G_111	46	0.004	16816	1.50	0.30	1.7%	6.70	112,614	16.9
PSEG Essex	2401_ G_112	46	0.004	17154	1.50	0.30	1.8%	7.15	122,683	18.4
PSEG Essex	2401_ G_113	46	0.004	16847	1.50	0.30	1.5%	6.20	104,513	15.7
PSEG Essex	2401_ G_114	46	0.004	16726	1.50	0.30	1.6%	6.53	109,251	16.4

PSEG Essex	2401_ G_121	46	0.004	16455	1.50	0.30	1.9%	7.49	123,289	18.5
PSEG Essex	2401_ G_122	46	0.004	16889	1.50	0.30	2.0%	7.90	133,445	20.0
PSEG Essex	2401_ G_123	46	0.004	16771	1.50	0.30	1.9%	7.60	127,493	19.1
PSEG Essex	2401_ G_124	46	0.001	16758	1.50	0.08	1.8%	7.24	121,333	5.1
PSEG Essex	2401_ G_9	81	0.022	10633	13.67	0.30	0.1%	0.57	6,026	0.9
PSEG Kearny	2404_ G_10	134	0.012	18700	4	0.30	0.3%	3.63	67,789	10.2
PSEG Kearny	2404_ G_11	134	0.012	18700	4	0.30	0.2%	2.78	51,981	7.8
PSEG Kearny	2404_ G_N121	43.8	0.004	9667	9	0.09	0.3%	1.25	12,097	0.6
PSEG Kearny	2404_ G_N122	43.7	0.004	9791	9	0.09	0.3%	1.15	11,299	0.5
PSEG Kearny	2404_ G_N123	43.8	0.004	10109	9	0.09	0.3%	1.33	13,463	0.6
PSEG Kearny	2404_ G_N124	43.7	0.004	9704	9	0.09	0.4%	1.39	13,488	0.6
PSEG Linden	2406_ G_5	86	0.005	12110	15	0.06	1.2%	9.20	111,371	3.3
PSEG Linden	2406_ G_6	86	0.005	12601	15	0.05	1.3%	9.55	120,318	3.0
PSEG Linden	2406_ G_7	84	0.005	12155	14	0.06	1.9%	14.25	173,152	5.1
PSEG Linden	2406_ G_8	84	0.006	13314	14	0.06	1.6%	11.99	159,613	5.1
PSEG Sewaren	2411_ B_1	104	-	12377	0	0.12	2.8%	25.71	318,163	18.6
PSEG Sewaren	2411_ B_2	118	-	13581	0	0.16	1.9%	19.24	261,271	21.0
PSEG Sewaren	2411_ B_3	107	-	14500	0	0.15	2.7%	25.45	368,953	28.0

PSEG Sewaren	2411_B_4	124	-	14500	0	0.14	1.6%	17.37	251,901	17.6
TOTAL								**4,119**	**38,694,923**	**886.9**
*The formula used to calculate Column I uses a multiplier of 8.760 because there are 8,760 hours of possible operation in the year; that factor is divided by 1,000 to yield units in GWh.										

As calculated in Table B.10.f, EPA is assuming that the increase in generation reflecting out-of-merit-order dispatch would be offset by decreasing generation at New Jersey combined cycle units, shown in these calculations as a representative unit with a heat rate (column B) and emission rate (column C) equal to the generation-weighted average of New Jersey combined cycle units.[33] This is a change from the proposal where a capacity-weighted average was used to determine the characteristics of the representative unit. The change was made for consistency across states where generation from a representative unit was used to offset increased generation due to out-of-merit order dispatch. Additionally, as explained in the preamble and based on comments received, EPA excluded any identified cogeneration units from these calculations. Finally, separate annual and ozone season emission and heat rates were calculated and the applicable ones were used as the situation warranted. The ozone season and annual NO_X emissions associated with the displaced generation (column D) were calculated by multiplying that generation by the average heat rate and the relevant emission rate at the representative combined cycle unit.

Table B.10.f.: Calculation of Emissions from Displaced Generation at New Jersey Combined Cycle Units

	A	*B*	*C*	*D*
Program Period	**Displaced Generation (GWh)**	**Heat Rate (BTU/kWh)**	**NO_X Emission Rate (lbs/MMBTU)**	**Displaced NO_X Emissions (tons)**
Calculation				*A*B*C/2000*
Annual	4,119	7,413	0.0136	208
Ozone Season	1,142	7,454	0.0144	61

The total revisions finalized to New Jersey's state budgets due to the revisions at BL England and accounting for the out-of-merit-order dispatch are demonstrated in Table B.10.g. The increase in emissions due to the changes at BL England Unit 1, which only impact the 2012 budgets, were added to the increase in emissions due to the out-of-merit-order generation, which impact both the 2012 and 2014 budgets. The emissions associated with the generation

[33] These generation-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Final Revisions Rule" found in the docket for this rulemaking.

displaced by the out-of-merit-order generation was subtracted from the increase in emissions to determine the net emission budget changes for New Jersey (row D).

Table B.10.g.: Calculation to Determine Net New Jersey SO_2, Annual NO_X, and Ozone Season NO_X Budget Revisions (tons)							
		2012			2014		
		SO_2	**Annual NO_X**	**Ozone Season NO_X**	**SO_2**	**Annual NO_X**	**Ozone Season NO_X**
A	Net Emissions Increases Due to Changes at BL England Unit 1	2,096	273	397	0	0	0
B	Additional Emissions Due to Out-Of-Merit-Order Generation	0	887	410	0	887	410
C	Displaced Emissions from Out-Of-Merit-Order Generation	0	208	61	0	208	61
D	**Net Budget Revisions for New Jersey (A+B-C)**	**2,096**	**952**	**746**	**0**	**679**	**349**

The original and revised values for the state SO_2, annual NO_X, and ozone season NO_X budgets, assurance levels, and new unit set-asides are described in Table B.10.h.

Table B.10.h.: Impact of New Jersey Budget Revisions – Assuming No FGD or SCR at BL England Unit 1 in 2012 and Out-of-Merit-Order Dispatch at Six Facilities (tons)						
			Assurance Level		Total New Unit Set-Aside*	
	Program	Budget	% of Budget	Tons	% of Budget	Tons
2012 Initial	SO_2	5,574	118%	6,577	2%	111
2012 Revised	SO_2	7,670	-	-	2%	153
2014 Initial	SO_2	5,574	118%	6,577	2%	111
2014 Revised	SO_2	5,574	118%	6,577	2%	111
2012 Initial	Annual NO_X	7,266	118%	8,574	2%	145
2012 Revised	Annual NO_X	8,218	-	-	2%	164
2014 Initial	Annual NO_X	7,266	118%	8,574	2%	145
2014 Revised	Annual NO_X	7,945	118%	9,375	2%	159
2012 Initial	Ozone-Season NO_X	3,382	121%	4,092	2%	68
2012 Revised	Ozone-Season NO_X	4,128	-	-	2%	83
2014 Initial	Ozone-Season NO_X	3,382	121%	4,092	2%	68
2014 Revised	Ozone-Season NO_X	3,731	121%	4,515	2%	75
*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations						

11) <u>Louisiana</u>

EPA is finalizing, as proposed, an increase to Louisiana's ozone season NO_X budget for 2012 and 2014 to reflect the assumption of near-term operational constraints affecting units at five plants, based on information provided by the system operator demonstrating that there are three out-of-merit-order dispatch areas in Louisiana: the West of the Atchafalaya Basin (WOTAB), Down Stream of Gypsy (DSG), and Amite South regions. EPA's analysis in the final Transport Rule did not incorporate the immediate-term local conditions described in recently submitted documentation that appear likely to necessitate non-economic generation at the units displayed below during the implementation of the Transport Rule programs. Specifically, EPA is assuming

additional generation will be dispatched at five plants (Nelson, Nine Mile Point, Michoud, Little Gypsy, and Waterford) based on the average capacity factor representing the frequency the unit is projected to be called to operate out-of-merit-order, derived from immediate-term dispatch modeling projections provided by Entergy.[34] As discussed later in this section, EPA assumes that the additional generation dispatched from these five facilities would offset generation that would otherwise come from combined cycle units within the state, and the revision to Louisiana's state budget is based on the net change to projected emissions taking that offsetting factor into account. The net impact of these changes on the state's ozone season NO_X budget is a 4,594 ton increase.

The calculations of the increase in ozone season NO_X emissions due to out-of-merit-order dispatch at the five facilities is shown in Table B.11.a. For each unit with out-of-merit-order dispatch, the capacity, 2012 emissions from TR_Remedy Final_2012, heat rate, generation from TR_Remedy Final_2012, and emission rate from EPA's NEEDS database are shown (columns A to G). The average out-of-merit-order capacity factor is shown in column H. The additional generation for out-of-merit-order dispatch was calculated by multiplying the capacity, the average out-of-merit-order capacity factor, and the number of hours in the ozone season (column I). The additional heat input required was calculated by multiplying the incremental generation by the unit's heat rate (column J). Finally, the additional emissions associated with the out-of-merit-order generation was calculated by multiplying the additional heat input by the unit's NO_X emission rate.

Table B.11.a.: Calculation to Determine Louisiana Ozone Season NO_X Budget Revisions - Assuming Out-of-Merit-Order Dispatch at Five Plants

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Ozone Season NO_X Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/ kWh)**	**Ozone Season Generation from TR_Remedy Final_2012 (GWh)**	**Ozone Season NO_X Rate (lbs/MMBtu)**	**Ozone Season Average Out-Of-Merit-Order Capacity Factor**	**Additional Ozone Season Generation***	**Additional Ozone Season Heat Input (MMBtu)**	**Additional Ozone Season NO_X Emissions (tons)**
Calculation								*C*H*3.672*	*E*I*	*G*J/2000*
R S Nelson	1393_B_3	153	0	10476	0	0.151	16%	89.89	941,694	70.9
R S Nelson	1393_B_4	500	0	10419	0	0.128	23%	422.28	4,399,735	281.3
Little Gypsy	1402_B_1	244	0	9978	0	0.278	7%	62.72	625,798	86.8

[34] Correspondence from Entergy to EPA, September 29, 2011. Please see the document "Transmission System Considerations – Entergy" in the docket for this rule making.

Little Gypsy	1402_B_2	415	0	10032	0	0.098	3%	45.72	458,627	22.5
Little Gypsy	1402_B_3	545	0	10179	0	0.311	24%	480.30	4,888,949	760.0
Nine Mile Point	1403_B_3	132	0	10264	0	0.149	11%	53.32	547,250	40.9
Nine Mile Point	1403_B_4	738	0	9955	0	0.337	31%	840.08	8,362,998	1,409.0
Nine Mile Point	1403_B_5	753	0	9841	0	0.298	34%	940.11	9,251,578	1,380.0
Michoud	1409_B_1	100	0	11427	0	0.042	0%	0.00	0	0.0
Michoud	1409_B_2	230	0	10997	0	0.207	30%	253.37	2,786,288	287.9
Michoud	1409_B_3	530	0	11288	0	0.105	45%	875.77	9,885,714	518.7
Waterford 1 & 2	8056_B_1	400	0	10238	0	0.123	3%	44.06	451,127	27.9
Waterford 1 & 2	8056_B_2	405	0	10137	0	0.116	7%	104.10	1,055,274	61.2
Total								**4,211.71**	**43,655,032**	**4,947.1**

*****The formula used to calculate Column I uses a multiplier of 3.672 because there are 3,672 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.

As calculated in Table B.11.b, EPA is assuming that the increase in generation reflecting out-of-merit-order dispatch would be offset by decreasing generation at Louisiana combined cycle units, shown in these calculations. Generation was first offset from Washington Parish, which commenters informed EPA that the plant was never completed and part were deconstructed,[35] with the remaining generation offset from a representative unit with a heat rate (column D) and emission rate (column E) equal to the generation-weighted average of Louisiana combined cycle units.[36] As explained in the preamble and based on comments received, EPA excluded any identified cogeneration units from these calculations. Finally, separate annual and ozone season emission and heat rates were calculated and the applicable ones were used as the situation warranted. The ozone season NO_X emissions associated with the displaced

[35] EPA-HQ-OAR-2009-0491-4803

[36] These generation-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Final Revisions Rule" found in the docket for this rulemaking.

generation (column G) were calculated by multiplying that generation by the average heat rate and the relevant emission rate at the representative combined cycle unit. The total displaced emissions (column H) were calculated by adding the emissions from the operation of Washington Parish in IPM (column F) to emissions displaced from the representative unit.

Table B.11.b.: Calculation of Emissions from Displaced Generation at Louisiana Combined Cycle Units								
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*
Program Period	**Displaced Generation (GWh)**	**Generation Displaced from Washington Parish (GWh)**	**Generation Displaced from other Combined Cycles (GWh)**	**Heat Rate (BTU/ kWh)**	**NO_X Emission Rate (lbs/MMBTU)**	**Displaced Emissions from Washington Parish (tons)**	**Displaced Emissions from other Combined Cycles (tons)**	**Total Displaced NO_X Emissions (tons)**
Calculation			*A-B*				*C*D*E/2000*	*F+G*
Ozone Season	4,212	1,806	2,405	7,480	0.031765081	67.7	286	353.4

The total revision proposed to Louisiana's state budget due to the out-of-merit-order dispatch is calculated in Table B.11.c. The emissions associated with the generation displaced by the out-of-merit-order generation (row B) were subtracted from the increase in emissions due to the out-of-merit-order generation (row A) to determine the net emission budget changes for Louisiana (row C).

Table B.11.c.: Calculation to Determine Net Louisiana Ozone Season NO_X Budget Revisions (tons)		
A	Additional Emissions Due to Out-Of-Order-Merit Dispatch	4,947
B	Displaced Emissions From Out-Of-Order-Merit Dispatch	353
C	**Net Emission budget Change For Louisiana (A-B)**	**4,594**

The original and revised values for the state ozone season NO_X budget, assurance level, and new unit set-aside are described in Table B.11.d.

Table B.11.d.: Impact of Louisiana Ozone-Season NO_X Budget Revisions – Assuming Out-of-Merit-Order Dispatch at Five Facilities (tons)

	Budget	Assurance Level		Total New Unit Set-Aside*	
		% of Budget	Tons	% of Budget	Tons
2012 Initial	13,432	121%	16,253	3%	403
2012 Revised	18,026	-	-	3%	541
2014 Initial	13,432	121%	16,253	3%	403
2014 Revised	18,026	121%	21,811	3%	541

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

12) <u>Mississippi</u>

EPA is finalizing, as proposed, an increase to Mississippi's ozone season NO_X budget in 2012 and 2014 to reflect the assumption of near-term operational constraints affecting units at three plants, based on information provided by the system operator demonstrating that the Mississippi Region is an out-of-merit-order dispatch area. EPA's analysis in the final Transport Rule did not incorporate the immediate-term local conditions described in recently submitted documentation that appear likely to necessitate non-economic generation at the units displayed below during the implementation of the Transport Rule programs. Specifically, EPA is assuming additional generation will be dispatched at three plants (Rex Brown, Gerald Andrus, and Baxter Wilson) based on the average capacity factor representing the frequency the unit is projected to be called to operate out-of-merit-order, derived from immediate-term dispatch modeling projections provided by Entergy.[37] As discussed later in this section, EPA assumes that the additional generation dispatched from these three facilities would offset generation that would otherwise come from combined cycle units within the state, and the revision to Mississippi's state budget is based on the net change to projected emissions taking that offsetting factor into account. The net impact of these changes on the state's ozone season NO_X budget is a 2,154 ton increase.

[37] Correspondence from Entergy to EPA, September 29, 2011. Please see the document "Transmission System Considerations – Entergy" in the docket for this rule making.

The calculations of the increase in ozone season NO_X emissions due to out-of-merit-order dispatch at the three facilities is shown in Table B.12.a. For each unit with out-of-merit-order dispatch, the capacity, 2012 emissions from TR_Remedy Final_2012, heat rate, generation from TR_Remedy Final_2012, and emission rate from EPA's NEEDS database are shown (columns A to G). The average out-of-merit-order capacity factor is shown in column H. The additional generation for out-of-merit-order dispatch was calculated by multiplying the capacity, the average out-of-merit-order capacity factor, and the number of hours in the ozone season (column I). The additional heat input required was calculated by multiplying the incremental generation by the unit's heat rate (column J). Finally, the additional emissions associated with the out-of-merit-order generation was calculated by multiplying the additional heat input by the unit's NO_X emission rate.

Table B.12.a.: Calculation to Determine Mississippi Ozone Season NO_X Budget Revisions - Assuming out-of-merit-order dispatch at three plants

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Ozone Season NO_X Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/ kWh)**	**Ozone Season Generation from TR_Remedy Final_2012 (GWh)**	**Ozone Season NO_X Rate (lbs/MMBtu)**	**Ozone Season Average Out-Of-Merit-Order Capacity Factor**	**Additional Ozone Season Generation* (GWh)**	**Additional Ozone Season Heat Input (MMBtu)**	**Additional Ozone Season NO_X Emissions (tons)**
Calculation								*C*H*3.672*	*E*I*	*G*J/2000*
Rex Brown	2053_B_4	200	0	14500	0	0.228	4%	29.38	425,952	48.6
Baxter Wilson	2050_B_1	475	0	10655	0	0.318	7%	122.09	1,300,912	207.1
Baxter Wilson	2050_B_2	771	0	10511	0	0.422	18%	509.60	5,356,407	1130.5
Gerald Andrus	8054_B_1	670	0	10748	0	0.209	33%	811.88	8,726,078	912.8
Total								**1472.95**	**15,809,348**	**2299.1**

*The formula used to calculate Column I uses a multiplier of 3.672 because there are 3,672 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.

As calculated in Table B.12.b, EPA is assuming that the increase in generation reflecting out-of-merit-order dispatch would be offset by decreasing generation at Mississippi combined cycle units, shown in these calculations as a representative unit with a heat rate (column B) and emission rate (column C)

equal to the generation-weighted average of Mississippi combined cycle units.[38] The emission and heat rates of this representative unit changed from the proposal because the proposal's calculations used annual, rather than ozone-season, data; the calculations for this final rule use ozone-season data. Additionally, as explained in the preamble and based on comments received, EPA excluded any identified cogeneration units from these calculations. The ozone season NO_X emissions associated with the displaced generation (column D) were calculated by multiplying that generation by the average heat rate and the relevant emission rate at the representative combined cycle unit.

Table B.12.b.: Calculation of Emissions from Displaced Generation at Mississippi Combined Cycle Units				
	A	*B*	*C*	*D*
Program Period	**Displaced Generation (GWh)**	**Heat Rate (BTU/kWh)**	**NO_X Emission Rate (lbs/MMBTU)**	**Displaced NO_X Emissions (tons)**
Calculation				*A*B*C/2000*
Ozone Season	1,473	7,570	0.026	145

The total revision to Mississippi's state budget due to the out-of-merit-order dispatch is calculated in Table B.12.c. The emissions associated with the generation displaced by the out-of-merit-order generation (row B) were subtracted from the increase in emissions due to the out-of-merit-order generation (row A) to determine the net emission budget changes for Mississippi (row C).

Table B.12.c.: Calculation to Determine Net Mississippi Ozone Season NO_X Budget Revisions (tons)		
A	Additional Emissions Due to Out-Of-Order-Merit Dispatch	2,299
B	Displaced Emissions From Out-Of-Order-Merit Dispatch	145
C	**Net Change in Emission budget For Mississippi (A-B)**	**2,154**

[38] These generation-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Final Revisions Rule" found in the docket for this rulemaking.

The original and revised values for the state ozone season NO_X budget, assurance level, and new unit set-aside are described in Table B.12.d.

Table B.12.d.: Impact of Mississippi Ozone-Season NO_X Budget Revisions – Assuming Out-of-Merit-Order Dispatch at Three Facilities (tons)

		Assurance Level		Total New Unit Set-Aside*	
	Budget	% of Budget	Tons	% of Budget	Tons
2012 Initial	10,160	121%	12,294	2%	203
2012 Revised	12,314	-	-	2%	246
2014 Initial	10,160	121%	12,294	2%	203
2014 Revised	12,314	121%	14,900	2%	246

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

13) <u>Texas (Out-of-Merit-Order Dispatch)</u>

EPA is finalizing, as proposed, an increase Texas's annual NO_X and ozone season NO_X budgets in 2012 and 2014 to reflect the assumption of near-term operational constraints affecting units at two plants, based on information provided by the system operator demonstrating that the Western and West of the Atchafalaya regions are out-of-merit-order dispatch areas. EPA's analysis in the final Transport Rule did not incorporate the immediate-term local conditions described in recently submitted documentation that appear likely to necessitate non-economic generation at the units displayed below during the implementation of the Transport Rule programs. Specifically, EPA is assuming additional generation will be dispatched at two plants (Lewis Creek and Sabine) based on the average capacity factor representing the frequency the unit is projected to be called to operate out-of-merit-order, derived from immediate-term dispatch projections provided by Entergy.[39] As discussed later in this section, EPA assumes that the additional generation dispatched from these two facilities would offset generation that would otherwise come from combined cycle units within the state, and the revisions to Texas's state budgets are based on the net change to projected emissions taking that offsetting factor into account. The net impact of these changes on the state's annual NO_X and ozone season NO_X budgets is a 1,375 ton increase to each budget.

The calculations of the increase in annual and ozone season NO_X emissions due to out-of-merit-order dispatch at the two facilities is shown in Table B.13.a. For each unit with out-of-merit-order dispatch, the capacity, 2012 emissions from TR_Remedy Final_2012, heat rate, generation from TR_Remedy Final_2012, and emission rate from EPA's NEEDS database are shown (columns A to G). The average out-of-merit-order capacity factor is shown in

[39] Correspondence from Entergy to EPA, September 29, 2011. Please see the document "Transmission System Considerations – Entergy" in the docket for this rule making.

column H. The additional generation for out-of-merit-order dispatch was calculated by multiplying the capacity, the average out-of-merit-order capacity factor, and the number of hours in the ozone season (column I). The additional heat input required was calculated by multiplying the incremental generation by the unit's heat rate (column J). Finally, the additional emissions associated with the out-of-merit-order generation was calculated by multiplying the additional heat input by the unit's NO_X emission rate.

Table B.13.a.: Calculation to Determine Texas NO_X* Budget Revisions - Assuming Out-of-Merit-Order Dispatch at Two Plants

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique ID**	**Capacity (MW)**	**2012 Ozone Season NO_X Emission from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Ozone Season Generation from TR_Remedy Final_2012 (GWh)**	**Ozone Season NO_X Rate (lbs/MMBtu)**	**Ozone Season Average Out-Of-Merit-Order Capacity Factor**	**Additional Ozone Season Generation** (GWh)**	**Additional Ozone Season Heat Input (MMBtu)**	**Additional Ozone Season NO_X Emissions (tons)**
Calculation								*C*H*3.672*	*E*I*	*G*J/2000*
Lewis Creek	3457_B_1	229	0	10325	0	0.020	47%	395.22	4,080,619	40.5
Lewis Creek	3457_B_2	230	0	10600	0	0.020	55%	464.51	4,923,785	48.5
Sabine	3459_B_1	230	0	11172	0	0.168	37%	312.49	3,491,107	293.8
Sabine	3459_B_2	230	0	10225	0	0.152	30%	253.37	2,590,688	197.2
Sabine	3459_B_3	420	0	10588	0	0.104	32%	493.52	5,225,356	271.7
Sabine	3459_B_4	530	0	9800	0	0.143	45%	875.77	8,582,566	613.5
Sabine	3459_B_5	480	0	10442	0	0.090	15%	264.38	2,760,698	124.8
Total								**3,059.25**	**31,654,818**	**1,589.8**

*Note: Since the increase in generation at these units is limited to the ozone season, the revised emissions calculated here apply equally to determination of the annual NOX and ozone-season NOX state budgets.
**The formula used to calculate Column I uses a multiplier of 3.672 because there are 3,672 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.

As calculated in Table B.13.b, EPA is assuming that the increase in generation reflecting out-of-merit-order dispatch would be offset by decreasing generation at Texas combined cycle units, shown in these calculations as a representative unit with a heat rate (column B) and emission rate (column C) equal to the generation-weighted average of Texas combined cycle units.[40] The ozone season NO_X emissions associated with the displaced generation (column D) were calculated by multiplying that generation by the average heat rate and the relevant emission rate at the representative combined cycle unit.

Table B.13.b.: Calculation of Emissions from Displaced Generation at Texas Combined Cycle Units*

	A	*B*	*C*	*D*
Program Period	**Displaced Generation (GWh)**	**Heat Rate (BTU/kWh)**	**NO_X Emission Rate (lbs/MMBTU)**	**Displaced NO_X Emissions (tons)**
Calculation				*A*B*C/2000*
Ozone Season	3,059	7,376	0.019	214

*Note: Since the increase in generation at these units is limited to the ozone season, the revised emissions calculated here apply equally to determination of the annual NOX and ozone-season NOX state budgets.

The total revisions to the Texas state budgets due to out-of-merit-order dispatch are calculated in Table B.13.c. The emissions associated with the generation displaced by the out-of-merit-order generation (row B) were subtracted from the increase in emissions due to the out-of-merit-order generation (row A) to determine the net emission budget changes for Texas (row C).

Table B.13.c.: Calculation to Determine Net Texas Annual NO_X and Ozone Season NO_X Budget Revisions*

A	Additional Emissions Due to Out-Of-Order-Merit Dispatch	1,590
B	Displaced Emissions From Out-Of-Order-Merit Dispatch	214
C	**Net Emission budget Change For Texas (A-B)**	**1,375**

*Note: Since the increase in generation at these units is limited to the ozone season, the revised emissions calculated here apply equally to determination of the annual NOX and ozone-season NOX state budgets.

[40] These generation-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Final Revisions Rule" found in the docket for this rulemaking.

In addition to the revisions summarized in Table B.13.c., the revisions to Texas state budgets outlined above in sections 3, 4, and 7 of this technical support document are summarized in Table B.13.d. The cumulative impacts of all of the technical revisions to the Texas budgets and NUSAs are summarized in Table B.13.e.[41]

Table B.13.d.: Summary of Texas SO_2 Budget Revisions	
Removed FGD Revision	26,359
FGD Capture Revision	24,158
Total SO_2 Budget Revision	**50,517**

[41] The increase to the new unit set-aside would necessarily change existing unit allowance allocations in order to maintain the state budget. To review the existing unit allowance allocations associated with this revision, please see the document entitled "Final Revisions Rule Unit-Level Allocations under the FIPs" found in the docket to this rulemaking.

Table B.13.e.: Impact of Texas Budget Revisions – Assuming Removed FGDs and Revised FGD Capture at Certain Units, Revised NUSAs for Oak Grove 2, and Out-of-Merit-Order Dispatch at Two Facilities (tons)						
			Assurance Level		Total New Unit Set-Aside*	
	Program	Budget	% of Budget	Tons	% of Budget	Tons
2012 Initial	SO_2	243,954	118%	287,866	5%	12,198
2012 Revised	SO_2	294,471	-	-	5%	14,724
2014 Initial	SO_2	243,954	118%	287,866	5%	12,198
2014 Revised	SO_2	294,471	118%	347,476	5%	14,724
2012 Initial	Annual NO_X	133,595	118%	157,642	3%	4,008
2012 Revised	Annual NO_X	134,970	-	-	4%	5,399
2014 Initial	Annual NO_X	133,595	118%	157,642	3%	4,008
2014 Revised	Annual NO_X	134,970	118%	159,265	4%	5,399
2012 Initial	Ozone-Season NO_X	63,043	121%	76,282	3%	1,891
2012 Revised	Ozone-Season NO_X	64,418	-	-	4%	2,577
2014 Initial	Ozone-Season NO_X	63,043	121%	76,282	3%	1,891
2014 Revised	Ozone-Season NO_X	64,418	121%	77,946	4%	2,577

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

Section C: Technical Revisions to States' TR Emission Budgets and NUSAs Relevant to Direct Final Rule

1) <u>South Carolina</u>

EPA is finalizing, based on comments, an increase to South Carolina's 2012 and 2014 SO_2 budgets to correct for the assumption that Flue Gas Desulfurization (FGD) technology is currently installed at the W S Lee Power Plant. There is no FGD planned or under construction at the unit. Therefore, EPA is finalizing an increase to the state's 2012 and 2014 SO_2 emission budgets to reflect projected emissions without these units operating a FGD. This results in a 8,013 ton increase to the state's SO_2 budgets in 2012 and 2014.

Table C.1.a.: Calculation to Determine South Carolina Budget Adjustment - Assuming no FGD at W S Lee

		A	B	C	D	E	F
Plant	Unit	Emissions from TR_Remedy Final_2012 (1000 tons)	HI from TR_Remedy_Final_2012 (TBtu)	Remedy Emission Rate from from TR_Remedy_Final_2012 (lbs/MMBtu)	Adjusted Emission Rate (lbs/MMBtu)	Adjusted Emissions (1000 tons)	Budget Adjustment (1000 tons)
Calculation				*A*2/B*		*D x B/2*	*E - A*
W S Lee	1	0.480468932	3.907141013	0.246	1.320	2.579	2.098
W S Lee	2	0.477953387	3.886684777	0.246	1.320	2.565	2.087
W S Lee	3	0.903656715	7.169244286	0.252	1.320	4.731	3.828
Total							**8.013**

In Table C.1.a., columns A, B, and C show the SO_2 emissions, heat input, and emission rate from the TR_Remedy_Final_2012 modeling when a FGD is assumed to be present at W S Lee. Because no FGD is present, EPA modified the emission rate to reflect the TR Base Case Final 2012 Remedy analysis where the FGD is assumed not to dispatch at the unit. This value approximates the emission rate expected at the unit at a cost threshold of $500/ton when no FGD is operating at the unit. EPA multiplied this SO_2 rate by the remedy heat input shown in column B to obtain a revised emissions projection for the unit (column E). The difference between this revised emission projection (no FGD assumed) and the final Transport Rule remedy analysis emission projection (FGD assumed) determines the amount of the increase to the state's SO_2 budget (column F).

This budget change will not result in any impact to the percent of the budget set aside for new units. Under the methodology in the final Transport Rule, the NUSA for SO_2 in South Carolina remains at 2%. The original and revised values for the state SO_2 budget, assurance level, and new unit set-aside are described in the table below.

Table C.1.b.: Impact of South Carolina's SO_2 Budget Revision - Assuming no FGD at W S Lee(tons)					
		Assurance Level		Total New Unit Set-Aside *	
	SO_2 Budget	% of Budget	Tons	% of Budget	Tons
2012 Before Direct Final Revisions Rule	88,620	-	-	2%	1,772
2012 After Direct Final Revisions Rule	96,633	-	-	2%	1,933
2014 Before Direct Final Revisions Rule	88,620	118%	104,572	2%	1,772
2014 After Direct Final Revisions Rule	96,633	118%	114,027	2%	1,933
*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations					

2) <u>Nebraska</u>

EPA is finalizing, based on comments, an increase to Nebraska's 2012 and 2014 SO_2 budgets to correct for the assumption that FGD technology is currently installed at Whelan Energy Center Unit 1. There is no FGD existing, planned, or under construction at the unit. There will likely be no FGD available at the time of the 2012 and 2014 compliance periods as originally assumed in EPA's determination of Nebraska's SO_2 budgets. Therefore, EPA is finalizing a revision the state's 2012 and 2014 SO_2 emission budgets to reflect this unit operating without an FGD. This results in a 2,334 ton increase to the state's 2012 and 2014 SO_2 budgets. The calculations to quantify this revision are shown in the table below.

Table C.2.a.: Calculation to Determine Nebraska Budget Adjustment - Assuming no FGD at Whelan Energy Center Unit 1

		A	B	C	D	E	F
Plant	Unit	Emissions from TR_Remedy Final_2012 (1000 tons)	HI from TR_Remedy_Final_2012 (TBtu)	Remedy Emission Rate from from TR_Remedy_Final_2012 (lbs/MMBtu)	Adjusted Emission Rate (lbs/MMBtu)	Adjusted Emissions	Budget Adjustment (1000 tons)
Calculation				*A*2/B*		*D x B/2*	*E - A*
Whelan Energy Center	1	0.255767801	6.394195158	0.0800	0.81	2.590	**2.334**

EPA is also finalizing, based on comments, a revision to Nebraska's 2012 and 2014 SO_2 budgets related to FGD technology at Whelan Energy Center Unit 2 and Nebraska City Unit 2. In the final Transport Rule analysis, EPA assumed these installations would be wet scrubbers; however, Nebraska Public Power District has informed EPA through comment that they are dry scrubbers instead.[42] In its analysis of the final Transport Rule, EPA assumed SO_2 removal rates of 95.9% for the wet scrubbers. However, dry scrubbers generally have lower SO_2 removal rates. EPA revised its removal assumption for these two units to reflect the lower SO_2 removal rates as reported by the sources themselves on EIA form 860 (95% removal for Nebraska unit 2 and 90.5% removal for Whelan unit 2). The revised projected SO_2 emissions from these units reflect the lower SO_2 removal rate (and consequently higher emissions) than these units would be assumed to achieve with wet scrubber technology. In accordance with this revision, EPA is finalizing a 776 ton increase to the Nebraska's 2012 and 2014 SO_2 emission budget.

[42] EPA-HQ-OAR-2009-0491-4754

Table C.2.b.: Calculation to Determine Nebraska's Annual SO_2 Budget Adjustment - Assuming dry FGD in place of Wet FGD (1000 tons)					
		A	B	C	D
	Unit	Emissions from TR_Remedy Final_2012 (95.9% removal)	Emissions assuming no FGD	Emissions assuming EIA 860 Rates	Emission Adjustment
Calculation			*A/.041*	*B*.05 or .095*	*C-A*
Nebraska City	2	1.142	27.854	1.393	0.251
Whelan Energy Center	2	0.399	9.732	0.925	0.526
Total		1.541	37.585	2.317	**0.776**

Column A shows the units' projected emissions assuming 95.9% removal characteristic of the assumed wet scrubber. Column B shows a calculation of projected emissions at each unit if the previously assumed FGD removal hadn't occurred at all; these "uncontrolled emissions" are calculated in order to allow application of the revised FGD removal rates of 95% for Nebraska City Unit 2 and 90.5% for Whelan Energy Center Unit 2 to the uncontrolled emissions, which yields the revised emission projection for each unit in column C. The difference between this revised emission projection (dry scrubbers assumed, column C) and the remedy emission projection (wet scrubbers assumed, column A) determines the amount of the increase to the state's 2012 and 2014 SO_2 budget (column D). The combined impact of these two budget adjustments is a 3,110 tons increase to the state's 2012 and 2014 SO_2 budgets.

This budget change will not result in any impact to the percent of the budget set aside for new units. Under the methodology in the final Transport Rule, the NUSA for SO_2 in Nebraska remains at 4%. The original and revised values for the state SO_2 budget, assurance level, and new unit set-aside are described in the table below.

Table C.2.c.: Nebraska SO_2 Budget, Assurance Level, and NUSA Before and After 3,800 SO_2 Budget Adjustment					
		Assurance Level		Total New Unit Set-Aside *	
	SO_2 Budget	% of Budget	Tons	% of Budget	Tons
2012 Before Direct Final Revisions Rule	65,052	-	-	4%	2,602
2012 After Direct Final Revisions Rule	68,162	-	-	4%	2,726
2014 Before Direct Final Revisions Rule	65,052	118%	76,761	4%	2,602
2014 After Direct Final Revisions Rule	68,162	118%	80,431	4%	2,726
*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations					

3) <u>Indiana</u>

EPA is finalizing, based on comments, an increase to Indiana's 2012 and 2014 SO_2 budgets to correct for the assumption that FGD technology is currently installed at Gallagher Units 2 and 4. There is no FGD existing, planned, or under construction at the units. These units do, however, have DSI technology installed with an SO_2 removal rate that achieves approximately 60% sulfur removal according to data reported by the sources on EIA form 860. Therefore, EPA is finalizing a revision to the state's 2012 and 2014 SO_2 emission budgets to reflect this unit operating with DSI instead of FGD. As noted by the commenter, the units are also subject to a NSR settlement agreement that imposes a .8 lbs/MMBtu limit for SO_2 at the units. Therefore, EPA revised its assumption to ensure that with the adjustment from FGD to DSI, that the source still honored its emission rate limits. This results in a 3,465 ton increase to the state's 2012 and 2014 SO_2 budgets. The calculations to quantify this revision are shown in the table below.

Table C.3.a.: Calculation to Determine Indiana SO_2 Budget Adjustment - Assuming DSI in place of FGD in 2012 and 2014 (1000 tons)					
		A	B	C	D
		Emissions from TR_Remedy Final_2012 (86% removal)	HI from TR_Remedy_Final_2012 (TBtu)	Emissions assuming .8 lbs/MMBtu Emission Rate	Emission Adjustment
Calculation				*B*.8*	*C-A*
Gallagher	2	1.066211595	6.957289314	2.783	1.717
Gallagher	4	1.08608673	7.08697939	2.835	1.749
Total		2.152	14.044	5.618	**3.465**

Column A shows the units' projected emissions with the 86% removal rate assumed in the TR_Remedy_Final. Column B shows the heat input projected for each unit in the TR remedy. This heat input is multiplied by the .8 lbs/mmbtu emission rate allowed under the settlement to arrive at the emissions value in column C – which reflects the DSI technology rather than FGD technology. The difference between this revised emission projection (DSI assumed, column C) and the remedy emission projection (FGD assumed, column A) determines the amount of the increase to the state's 2012 and 2014 SO_2 budget (column D). The combined impact of these two budget adjustments is a 3,465 tons increase to the state's 2012 and 2014 SO_2 budgets.

EPA is also finalizing, based on comments, an adjustment to the 2012 and 2014 SO_2 budget for Indiana based on the amount of flue gas that passes through the FGD at Gibson Unit 5. The commenter noted that because of this scrubber's design limitation, the facility may be limited in the amount of flue gas that can be passed through the existing FGD. The Gibson unit in Indiana reports less than 100% pass-through of flue gas on EIA form 860. Consequently, at this unit, the effective removal rate of the FGD as applied to total SO_2 emissions would be lower than the reported removal rate would otherwise indicate. EPA is finalizing an adjustment to the Indiana budget to account for the inability of the Gibson unit to pass all of its flue gas through its scrubber. Consistent with the approach EPA used to finalize similar revisions, EPA is finalizing this revision based on the SO_2 removal efficiency and flue gas treatment data reported for these scrubbers by the facility operators to the EIA on form 860. The approach results in a final 2012 and 2014 SO_2 budget increase of 1,873 tons.

Table C.3.b.: Calculation to Determine Indiana SO_2 Budget Adjustment – Assuming Revised SO_2 removal Rates at FGD								
		A	B	C	D	E	F	G
Plant Name	Unit ID	Total SO_2 Emissions from TR_Remedy_Final (1000 tons)	EIA 860 Removal Rate (used in budget determination)	EIA 860 Percent of Flue Gas Entering FGD	Calculated Removal Rate (used for budget revision estimate)	Uncontrolled Emissions (assuming no FGD)(1000 tons)	Revised Emissions (assuming FGD with revised removal rate) (1000 tons)	Net Budget Revision (1000 tons)
Calculation					*B*C*	*A/(1-B)*	*E*(1-D)*	*F-A*
Gibson	5	4.928346201	0.95	98%	0.931	98.566924	6.8011178	**1.873**

Column A shows the projected emissions at the unit as originally modeled in the final Transport Rule remedy for 2012. Column B shows the SO_2 removal rate that the 2012 emission projections are based on. Column C shows the source reported percent of flue gas entering FGD. Column D shows the effective removal rate based on multiplying the removal rate by the percent of flue gas entering FGD. Column E shows a calculation of projected emissions at each unit if the previously assumed FGD removal hadn't occurred at all; these "uncontrolled emissions" are calculated in order to allow application of the revised FGD removal rate shown in column D to these uncontrolled emissions, which yields the revised emission projection for each unit in column F. The difference between this revised emission projection (lower FGD capture assumed, column F) and the remedy emission projection (higher FGD capture assumed, column A) determines the amount of the increase to the state's SO_2 budget (column G).

The combined impact of these two changes to Indiana's 2012 and 2014 budget is 5,338 tons. This budget change will not result in any impact to the percent of the budget set aside for new units. Under the methodology in the final Transport Rule, the NUSA for SO_2 in Indiana remains at 3%. The original and revised values for the state SO_2 budget, assurance level, and new unit set-aside are described in the table below.

Table C.3.c: Impact of Indiana's 2012 and 2014 SO_2 Budget Revision					
		Assurance Level		Total New Unit Set-Aside *	
	SO_2 Budget	% of Budget	Tons	% of Budget	Tons
2012 Before Direct Final Revisions Rule	285,424	-	-	3%	8,563
2012 After Direct Final Revisions Rule	290,762	-	-	3%	8,723
2014 Before Direct Final Revisions Rule	161,111	118%	190,111	3%	4,833
2014 After Direct Final Revisions Rule	166,449	118%	196,410	3%	4,993
*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations					

4) <u>Ohio</u>

EPA is finalizing, based on comments, an increase to Ohio's 2012 and 2014 annual NO_X and ozone-season NO_X budgets to correct for the assumption that Selective Catalytic Reduction (SCR) technology is currently installed at Bay Shore Unit 4 in 2012. There is no SCR planned or under construction at the unit. Therefore, EPA is finalizing an increase to the state's 2012 and 2014 annual NO_X and ozone-season NO_X emission budgets to reflect projected emissions without this unit operating a SCR. This results in a 2,218 ton increase to the state's annual NO_X budgets in 2012 and 2014, and a 964 ton increase in the state's ozone-season NO_X budgets in 2012 and 2014.

Table C.4.a.: Calculation to Determine Ohio Budget Adjustment - Assuming no SCR at Bay Shore 4							
		A	B	C	D	E	F
Plant	Unit	Emissions from TR_Remedy Final_2012 (1000 tons)	HI from TR_Remedy_Final_2012 (TBtu)	Remedy Emission Rate from from TR_Remedy_Final_2012 (lbs/MMBtu)	Adjusted Emission Rate (lbs/MMBtu)	Adjusted Emissions	Budget Adjustment (1000 tons)
Calculation				*A*2/B*		*D x B/2*	*E - A*
Bay Shore	4	0.468366563	13.4995095	0.069	0.398	2.686	**2.218**
Bay Shore	4	0.203626114	5.86901984	0.069	0.398	1.168	**0.964**

Columns A, B, and C show the NO_X emissions, heat input, and emission rate from the TR_Remedy_Final_2012 modeling when a SCR is assumed to be present the unit. Because no SCR is present, EPA modified the emission rate to reflect the "controlled NO_X policy rate" in the NEEDS version from the September 1, 2010 TR Notice of Data Availability (NODA) (column D).[43] This value reflects the NO_X emission rate assumed in EPA's modeling of the Transport Rule as originally proposed, when EPA did not assume a SCR to be present at the unit. This value approximates the emission rate expected at the unit at a cost threshold of $500/ton when no SCR is present at the unit. EPA multiplied this NO_X rate by the remedy heat input shown in column B to obtain a revised emissions projection for the unit (column E). The difference between this revised emission projection (no SCR assumed) and the final Transport Rule remedy analysis emission projection (SCR assumed) determines the amount of the increase to the state's annual NO_X and ozone-season NO_X budget (column F). The first row shows the calculation for the annual NOx budget adjustment and the second row shows the calculation for ozone season NOx adjustment.

This budget change will not result in any impact to the percent of the budget set aside for new units. Under the methodology in the final Transport Rule, the NUSAs for annual NO_X and ozone-season NO_X in Ohio remain at 2%. Along with revisions accounting for out-of-merit order dispatch at units in Ohio presented below, the original and revised values for the state budgets, assurance levels, and new unit set-asides are described in Table C.18.g.

5) <u>New York</u>

EPA is finalizing, based on comments, an increase to New York's 2012 and 2014 SO_2 budgets to correct for the removal rate assumption regarding DSI technology at the Dunkirk and Huntley facilities. As noted in the "Significant Contribution and State Emissions Budgets Final Rule TSD" for the final Transport Rule, EPA had received comment during the rule proposal noting that these facilities had DSI in place of the FGD assumed in the modeling. EPA adjusted the state budgets before finalizing the Transport Rule to reflect DSI technology. Because no verifiable removal rate was submitted for the technologies in the comment at this time, EPA assumed the default 70% removal rate used for new DSI. However, during the comment period for the Revisions Rule, a commenter noted that these units' existing DSI systems are not capable of achieving such a rate. The commenter's claim is corroborated by newly available 2010 EIA 860 data providing a reported SO_2 removal rate of 53% for the units. EPA has calculated a budget adjustment to New York's SO_2 budgets in 2012 and 2014 assuming an SO_2 removal rate of 53% as opposed to the 70% rate previously assumed in the final Transport Rule at these units.

[43] <u>See</u> National Electric Energy Data System (NEEDS) v4.10 available at http://www.epa.gov/airmarkets/progsregs/epa-ipm/BaseCasev410.html

Table C.5.a.: Calculation to Determine New York Budget Adjustment - Correcting for DSI Removal Rates						
		A	B	C	D	E
	Unit	Removal Rate Assumed in TR_Remedy_Final_2012	Emissions from TR_Remedy Final_2012 (1000 tons)	Emissions assuming 70% removal (1000 tons)	Emissions Assuming 53% removal (1000 tons)	Net Budget Adjustment (1000 tons)
Calculation				*B/(1-A)*.3*	*B/(1-A)*.47*	*D-C*
C R Huntley Generating Station	67	92.3%	0.340946408	1.328362629	2.081101451	0.752738823
C R Huntley Generating Station	68	92.3%	0.340946408	1.328362629	2.081101451	0.752738823
Dunkirk Generating Station	3	95.9%	0.383454384	2.805763788	4.3956966	1.589932813
Dunkirk Generating Station	4	95.9%	0.38488252	2.81621356	4.41206791	1.59585435
Dunkirk Generating Station	1	70.0%	0.623572839	0.623572839	0.976930781	0.353357942
Dunkirk Generating Station	2	70.0%	0.55670215	0.55670215	0.872166702	0.315464552
Total			**2.63050471**	**9.458977594**	**14.8190649**	**5.360**

Column A and B show the removal rate and corresponding emissions assumed in the initial TR_Final_Rule modeling. Column C shows the adjusted emissions assuming 70% removal efficiency that was assumed for the Final Transport Rule Budget determination. Column D shows the emission for these units assuming a 53% removal rate (as reported in the EIA 860 form for the units). Column E shows the net budget adjustment necessary to correct the 70% removal efficiency with a 53% removal efficiency for the DSI present at the facilities. This results in a 5,360 ton increase to the state's SO_2 budget for 2012 and 2014.

This budget change will not result in any impact to the percent of the budget set aside for new units. Under the methodology in the final Transport Rule, the NUSA for SO_2 in New York remains at 2%. Along with revisions accounting for out-of-merit order dispatch at units in New York presented below, the original and revised values for the state budgets, assurance levels, and new unit set-asides are described in Table C.19.g.

6) <u>Kansas</u>

EPA is finalizing, based on comment, an update to Kansas's 2014 annual NO_X budget to correct for the assumption that particular Westar consent decree emission rate and tonnage cap requirements begin in 2015, not 2014 as assumed in the final rule analysis. The final 2014 Transport Rule modeling applied SCR retrofit technology to some capacity at the Jeffrey Energy Center to comply with the 0.1 lb/MMBtu rate requirement of the Westar consent

decree; however, because this rate requirement does not begin until 2015, EPA is assuming that the emission rate requirements of the consent decree do not result in any new controls until 2015 at the Jeffrey Energy Center. This revised assumption would, if examined in isolation, yield an increase of 6,465 tons in projected annual NO_X emissions in Kansas in 2014, which would bring total projected NO_X emissions from covered EGUs in Kansas to a level that exceeds the state's 2012 budget. However, as explained in the final Transport Rule, "for any covered state whose emissions of a relevant pollutant are projected to increase from 2012 to 2014 under the relevant cost thresholds… EPA is finalizing that state's 2014 emission budget to maintain the same level of the 2012 emission budget" (76 FR 48261). Therefore, EPA is increasing the 2014 Kansas NO_X budget by 5,154 tons so that it matches, not exceeds, the state's 2012 budget following the methodology and rationale laid out in the final Transport Rule.

This budget change will not result in any impact to the percent of the budget set aside for new units. Under the methodology in the final Transport Rule, the NUSA for annual NOX in Kansas remains at 2%. Along with revisions accounting for out-of-merit order dispatch at units in Kansas presented below, the original and revised values for the state budgets, assurance levels, and new unit set-asides are described in Table C.14.f.

7) Georgia

EPA is finalizing, based on comment, an update to Georgia's 2014 SO_2, annual NO_X, and ozone-season NO_X state budgets to correct for the assumption in the final Transport Rule analysis that particular Georgia Multi-Pollutant State Rule control deadlines for FGD/SCR retrofits at Branch, Scherer, and Yates facilities would deliver emission reductions in 2014, whereas those reductions are in fact not required to occur until 12/31/2014 or later. Because these controls are not required by that state rule to operate in 2014, EPA is adjusting the 2014 budgets upwards to reflect the non-operation of the controls at these units.[44]

[44] EPA based these revisions on the schedule of retrofit deadlines that is most consistent with comments provided, which generally reflected the requirements of the Georgia Multi-Pollutant State Rule as it existed when EPA finalized the Transport Rule in July of 2011.

Table C.7.a.: Calculation to Determine Georgia SO_2 Budget Adjustments - Assuming Revised Control Start Dates					
	SO_2				
	A	*B*	*C*	*D*	*E*
	2012 Emission Rate from TR_Remedy_Final (lbs/MMBtu)	2014 Heat Input (TBtu)	2014 Revised Emissions (1000 tons)	2014 TR_Remedy_Final Emissions (1000 tons)	Net Budget Adjustment (1000 tons)
Calculation			*A x B*		*C - D*
Branch 1	0.92	16.50	7.60	1.85	5.74
Branch 2	0.92	20.06	9.24	2.25	6.99
Scherer 1	0.57	57.61	16.49	6.43	10.06
Yates 6	0.91	21.23	9.70	0.86	8.84
Yates 7	0.91	20.89	9.55	0.85	8.70
Total					**40.334**

Table C.7.b.: Calculation to Determine Georgia NO_X Budget Adjustments - Assuming Revised Control Start Dates					
	Annual NO_X				
	A	*B*	*C*	*D*	*E*
	2012 Emission Rate from TR_Remedy_Final (lbs/MMBtu)	2014 Heat Input (TBtu)	2014 Revised Emissions (1000 tons)	2014 TR_Remedy_Final Emissions (1000 tons)	Net Budget Adjustment (1000 tons)
Calculation			*A x B*		*C - D*
Branch 1	0.45	16.50	3.75	0.60	3.15
Branch 2	0.43	20.06	4.36	0.69	3.67
Scherer 1	0.15	57.61	4.20	2.02	2.18
Yates 6	0.26	21.23	2.80	0.73	2.07
Yates 7	0.28	20.89	2.88	0.75	2.13
Total					**13.198**

Table C.7.c.: Calculation to Determine Georgia Ozone-Season NO_X Budget Adjustments - Assuming Revised Control Start Dates					
	Ozone-Season NO_X				
	A	*B*	*C*	*D*	*E*
	2012 Emission Rate from TR_Remedy_Final (lbs/MMBtu)	2014 Heat Input (TBtu)	2014 Revised Emissions (1000 tons)	2014 TR_Remedy_Final Emissions (1000 tons)	Net Budget Adjustment (1000 tons)
Calculation			*A x B*		*C - D*
Branch 1	0.45	7.19	1.63	0.26	1.37
Branch 2	0.43	8.74	1.90	0.30	1.60
Scherer 1	0.15	25.29	1.84	0.89	0.96
Yates 6	0.26	9.27	1.22	0.32	0.91
Yates 7	0.28	9.12	1.26	0.33	0.93
Total					**5.762**

In each of the above tables, column A reflects the emission rate observed for that unit in the 2012 TR_Remedy_Final when no FGD or SCR is present. Column B reflects the heat input assumed in the 2014 TR_Remedy_Final analysis when a FGD or SCR was assumed to be present. Column C multiplies the heat input by the uncontrolled emission rate to get the uncontrolled emission rate assumption for 2014. The difference between this uncontrolled emissions values (column C) and the controlled emissions value originally assumed (column D) results in the amount of the budget increase (column E).

This budget change will not result in any impact to the percent of the budget set aside for new units. Under the methodology in the final Transport Rule, the NUSA for SO_2 in Georgia remains at 2%. The original and revised values for the state budgets, assurance levels, and new unit set-asides are described in the table below.

Table C.7.d.: Impact of Georgia's Budget Revisions - Assuming Revised Control Start Dates						
			Assurance Level		Total New Unit Set-Aside *	
	Program	Budget	% of Budget	Tons	% of Budget	Tons
2012 Before Direct Final Revisions Rule	SO_2	158,527	-	-	2%	3,171
2012 After Direct Final Revisions Rule	SO_2	158,527	-	-	2%	3,171
2014 Before Direct Final Revisions Rule	SO_2	95,231	118%	112,373	2%	1,905
2014 After Direct Final Revisions Rule	SO_2	135,565	118%	159,967	2%	2,711
2012 Before Direct Final Revisions Rule	Annual NO_X	62,010	-	-	2%	1,240
2012 After Direct Final Revisions Rule	Annual NO_X	62,010	-	-	2%	1,240
2014 Before Direct Final Revisions Rule	Annual NO_X	40,540	118%	47,837	2%	811
2014 After Direct Final Revisions Rule	Annual NO_X	53,738	118%	63,411	2%	1,075
2012 Before Direct Final Revisions Rule	Ozone-Season NO_X	27,944	-	-	2%	559
2012 After Direct Final Revisions Rule	Ozone-Season NO_X	27,944	-	-	2%	559
2014 Before Direct Final Revisions Rule	Ozone-Season NO_X	18,279	121%	22,118	2%	366
2014 After Direct Final Revisions Rule	Ozone-Season NO_X	24,041	121%	29,090	2%	481
*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations						

8) Arkansas (NUSA)

Turk Unit 1 in Arkansas commences commercial operation on or after January 1, 2010. Such a date qualifies Turk Unit 1 as a "planned" new unit by the definition of that category described in the "Allowance Allocation Final Rule TSD" for the final Transport Rule. However, in the final Transport Rule, EPA did not recognize Turk Unit 1 as a new unit and therefore omitted its projected emissions in the determination of the ozone-season NO_X new unit set-aside for Arkansas. Prior to this revision, in keeping with a revision demonstrated above and effected in the final revisions rule, that state's NUSA was set at 5%, including the minimum 2% NUSA percentage plus a 3% state-specific percentage to account for other planned units.[45] EPA is now revising the calculation of the Arkansas ozone-season NO_X new unit set-aside to reflect the "new unit" status of Turk Unit 1. Following the schedule established in the

[45] As explained in the final Transport Rule, the minimum size of any state's new unit set-aside is this "base percentage" amount, to which "state-specific" percentages are added if the given state has projected emissions from "planned" new units (76 FR 48291).

final Transport Rule, EPA has already recorded (i.e., distributed) allowances under the Federal Implementation Plan (FIP) for Arkansas for 2012 and 2013. Therefore, this revision to the NUSA will be implemented beginning in 2014.

The calculations to estimate 2020 ozone-season NO_X Emissions from Turk Unit 1 are shown in the table below:

	Table C.8.a.: Calculation for Arkansas' Total Ozone-Season NO_X Emissions from Turk Unit 1[46]	
A	Capacity (MW)	600
B	Heat Rate (Btu/kWh)	8980
C	NO_X Emissions Rate (lbs/MMBtu)	0.05
D	Capacity Factor	85%
E	Ozone-Season Hours	3672
	Total Ozone-Season NO_X Emissions (tons) (*A*D*B*/1000**E*C*/2000)	420

The calculations to quantify this revision are shown in the table below:

	Table C.8.b.: Calculation for Arkansas' NUSA	
A	Projected 2020 Ozone-Season NO_X Emissions from Turk Unit 1 (tons)	420
B	Arkansas 2014 Ozone-Season NO_X State Budget (tons)	15,110
C	Turk's Emissions as a % of Arkansas State Budget (*A/B*)	3%
D	Previous Percentage for New Unit Set-Aside	5%
E	Total New Unit Set-Aside (*C* + *D*)	8%

EPA divided Turk Unit 1's projected emissions into the state budget to derive the state-specific percentage increase for the new unit set-aside in Arkansas, which rounds to 3%. This value was added to the new unit set-aside percentage previously calculated for the final revisions rule (5%) found

[46] Projected 2020 ozone-season NO_X emissions were estimated and the new unit set-aside was calculated using the method outlined in the final Transport Rule (76 FR 48291) and the Technical Revisions to State Budgets and New Unit Set-Asides associated with the Final Rule. EPA used data provided by the commenter and IPM model plant assumptions.

earlier in this document. The resulting new unit set-aside percentage for ozone-season NO_X in Arkansas is 8%. This change does not impact the state budget or assurance level in any way. However, the new unit set-aside would change by the levels shown below.[47]

Table C.8.c: Impact of 2014 Ozone Season NO_X NUSA revision for Arkansas

	New Unit Set-Aside	Existing Unit Allocation	Total
2014 As Finalized in Final Revisions Rule %	5%	95%	100%
2014 With Direct Final Rule Revision %	8%	92%	100%
2014 As Finalized in Final Revisions Rule tons	752	14,285	15,037
2014 With Direct Final Rule Revision tons*	1,209	13,901	15,110

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

9) Louisiana (NUSA)

Washington Parish Energy Center Units CTG1, CTG2 and ST1 were included in the final Transport Rule NUSA calculations as planned units to commence commercial operation on or after January 1, 2010. However, these units were never completed and will not be operating. Therefore, EPA is removing their projected emissions from calculations for the Louisiana ozone-season NO_X NUSA. Prior to this revision, that state's NUSA was set at 3%, including the minimum 2% NUSA percentage plus a 1% state-specific percentage to account for planned units.[48] EPA is now revising the calculation of the Louisiana ozone-season NO_X new unit set-aside to remove the projected emissions of these units that will not be commencing operation. This change will take effect for Louisiana's NUSA in 2012 and beyond.[49]

[47] The increase to the new unit set-aside would necessarily change existing unit allowance allocations in order to maintain the state budget. To review the existing unit allowance allocations associated with this revision, please see the document entitled "Final Revisions Rule Unit-Level Allocations under the FIPs" found in the docket to this rulemaking.

[48] As explained in the final Transport Rule, the minimum size of any state's new unit set-aside is this "base percentage" amount, to which "state-specific" percentages are added if the given state has projected emissions from "planned" new units (76 FR 48291).

[49] The originally projected emissions from Washington Parish Energy Center are no longer relevant to any of EPA's emission projections for the state of Louisiana pertinent to the Transport Rule, as all of its projected generation was offset in the final revisions rule by revised assumptions of increased generation from other Louisiana units due to near-term out-of-merit-order dispatch conditions.

EPA subtracted the Washington Parish units' projected emissions from the projected planned unit emissions for Louisiana. The remaining planned emissions were divided into the state budget to derive the revised state-specific percentage for the new unit set-aside in Louisiana, which rounds to 0%. Therefore, the new unit set-aside percentage for ozone-season NO_X in Louisiana is 2%, the base percentage for the new unit set-aside.

	Table C.9.a.: Calculation for Louisiana's NUSA	
A	Previously Calculated Total Planned Emissions (tons)	126
B	Projected 2020 Ozone-Season NO_X Emissions from Washington Parish (tons)	68
C	Remaining Planned Emissions (A - B)	58
D	Louisiana Ozone Season NO_X State Budget (tons)	18,136
E	Remaining Committed Emissions as a % of Arkansas State Budget (*C/D*)	0%
F	Base percentage for new unit set-aside	2%
G	Total New Unit Set-Aside (*E* + *F*\)	2%

This change does not impact the state budget or assurance level in any way. However, the new unit set-aside would change by the levels shown below.[50] EPA intends to record any additional 2012 and 2013 allocations to existing units due to this revision once this rule, and the underlying final Transport Rule, are legally effective.

[50] The proposed decrease to the new unit set-aside would necessarily change existing unit allowance allocations in order to maintain the state budget. To review the existing unit allowance allocations associated with this revision, please see the document entitled "Final Revisions Rule Unit-Level Allocations under the FIPs" found in the docket to this rulemaking.

Table C.9.b: Impact of 2012 Ozone Season NO_X NUSA revision for Louisiana			
	New Unit Set-Aside	Existing Unit Allocation	Total
2012 As Finalized in Final Revisions Rule %	3%	97%	100%
2012 With Direct Final Rule Revision %	2%	98%	100%
2012 As Finalized in Final Revisions Rule tons	523	17,503	18,026
2012 With Direct Final Rule Revision tons*	344	17,771	18,115
2014 As Finalized in Final Revisions Rule %	3%	97%	100%
2014 With Direct Final Rule Revision %	2%	98%	100%
2014 As Finalized in Final Revisions Rule tons	523	17,503	18,026
2014 With Direct Final Rule Revision tons*	344	17,771	18,115

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

10) Missouri (NUSA)

Iatan Unit 2 in Missouri commenced commercial operation on or after January 1, 2010. Such a date qualifies Iatan Unit 2 as a "planned" new unit by the definition of that category described in the "Allowance Allocation Final Rule TSD" for the final Transport Rule. However, in the final Transport Rule, EPA did not recognize Iatan Unit 2 as a new unit and therefore omitted its projected emissions in the determination of the SO_2, annual NO_X and ozone-season NO_X new unit set-asides for Missouri. For the final Transport Rule and the Transport Rule Supplemental Notice of Final Rulemaking, the state's NUSAs were set at 2% for SO_2, 3% for annual NO_X and 3% for ozone-season NO_X, including the minimum 2% NUSA percentage plus a state-specific percentage for each budget.[51] EPA is now revising the calculations of the Missouri new unit set-asides to reflect the "new unit" status of Iatan Unit 2. Following the schedule established in the final Transport Rule, EPA has already recorded (i.e., distributed) allowances under the FIPs for Missouri for 2012. Therefore, this revision to the NUSAs will be implemented beginning in 2013.

[51] As explained in the final Transport Rule, the minimum size of any state's new unit set-aside is this "base percentage" amount, to which "state-specific" percentages are added if the given state has projected emissions from "planned" new units (76 FR 48291).

The calculations to quantify Projected 2020 Emissions from Turk Unit 1 are shown in the table below[52]:

	Table C.10.a.: Calculation for Missouri's NUSA			
		SO_2	NO_X	Ozone Season NO_X
A	Capacity (MW)	850	850	850
B	Heat Rate (Btu/kWh)	9000	9000	9000
C	Emissions Rate (lbs/MMBtu)	0.06	0.05	0.05
D	Capacity Factor	85%	85%	85%
E	Ozone Season Hours	8760	8760	3672
	Total Emissions (tons) (*A***D***B*/1000**E***C*/2000)	1709	1424	598

EPA divided Iatan Unit 2's projected emissions into the state budgets to derive the increases to the state-specific percentages for the new unit set-asides in Missouri, which round to 1% for SO_2, 3% for annual NO_X and 3% for ozone-season NO_X. These values were added to the existing percentages for new unit set-asides from the final Transport Rule and the Transport Rule Supplemental Notice of Final Rulemaking . The resulting new unit set-aside percentages in Missouri are 3% for SO_2, 6% for annual NO_X and 6% for ozone-season NO_X. This change does not impact the state budget or assurance level in any way. However, the NUSAs would change by the levels shown below.[53]

[52] Projected 2020 ozone-season NO_X emissions were calculated using the method outlined in the final Transport Rule (76 FR 48291) and the Technical Revisions to State Budgets and New Unit Set-Asides associated with the Final Rule. EPA used data provided by the commenter, IPM model plant assumptions and plant data published in the following: Robert Peltier, Plant of the Year: KCP&L's Iatan 2 Earn's POWER's Highest Honor, Power Magazine, August 1, 2011, available on the internet at <http://www.powermag.com/environmental/3882.html>.

[53] The increase to the new unit set-aside would necessarily change existing unit allowance allocations in order to maintain the state budget. To review the existing unit allowance allocations associated with this revision, please see the document entitled "Final Revisions Rule Unit-Level Allocations under the FIPs" found in the docket to this rulemaking.

Table C.10.b: Impact of 2013 NUSA revisions for Missouri (tons)									
	SO_2 New Unit Set-Aside	SO_2 Existing Unit Allocation	SO_2 Total	Annual NO_X New Unit Set-Aside	Annual NO_X Existing Unit Allocation	Annual NO_X Total	OS NO_X New Unit Set-Aside	OS NO_X Existing Unit Allocation	OS NO_X Total
% As Finalized in Final Revisions Rule	2%	98%	100%	3%	97%	100%	3%	97%	100%
% With Direct Final Rule Revision	3%	97%	100%	6%	94%	100%	6%	94%	100%
2013 As Finalized in Final Revisions Rule tons	4,149	203,317	207,466	1,571	50,803	52,374	683	22,079	22,762
2013 With Direct Final Rule Revision tons*	6,224	201,242	207,466	3,144	49,256	52,400	1,367	21,421	22,788
2014 As Finalized in Final Revisions Rule tons	3,319	162,622	165,941	1,462	47,255	48,717	632	20,441	21,073
2014 With Direct Final Rule Revision tons*	4,978	160,963	165,941	2,925	45,818	48,743	1,266	19,833	21,099

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

11) <u>Mississippi</u>

EPA is finalizing, based on comments, an increase to Mississippi's ozone season NO_X budget in 2012 and 2014 to reflect the assumption of near-term operational constraints affecting a unit at the Moselle plant, based on information provided by the system operator demonstrating that the plant is located in an out-of-merit-order dispatch area. EPA's analysis in the final Transport Rule did not incorporate the immediate-term local conditions described in recently submitted documentation that appear likely to necessitate non-economic generation at the units displayed below during the implementation of the Transport Rule programs. Specifically, EPA is assuming additional generation will be dispatched at Moselle based on the need to provide voltage support and regulation in the load pocket and the minimum operating constraint of a unit at Moselle.[54] As discussed later in this section, EPA assumes that the additional generation dispatched from this facility would offset generation that would otherwise come from combined cycle units within the state, and the

[54] EPA-HQ-OAR-2009-0491-4763 and EPA-HQ-OAR-2009-0491-4746

revision to Mississippi's state budget is based on the net change to projected emissions taking that offsetting factor into account. The net impact of these changes on the state's ozone season NO_X budget is a 115 ton increase.

The calculations of the increase in ozone season NO_X emissions due to out-of-merit-order dispatch at Moselle is shown in Table C.11.a. For the unit, the capacity, 2012 emissions from TR_Remedy Final_2012, heat rate, generation from TR_Remedy Final_2012, and emission rate from EPA's NEEDS database are shown (columns A to G). The average out-of-merit-order capacity factor is shown in column H. The additional generation for out-of-merit-order dispatch was calculated by multiplying the capacity, the average out-of-merit-order capacity factor, and the number of hours in the ozone season (column I). The additional heat input required was calculated by multiplying the incremental generation by the unit's heat rate (column J). Finally, the additional emissions associated with the out-of-merit-order generation was calculated by multiplying the additional heat input by the unit's NO_X emission rate.

Table C.11.a.: Calculation to Determine Mississippi Ozone Season NO_X Budget Revisions - Assuming out-of-merit-order dispatch at plant Moselle

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Ozone Season NO_X Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/ kWh)**	**Ozone Season Generation from TR_Remedy Final_2012 (GWh)**	**Ozone Season NO_X Rate (lbs/MMBtu)**	**Ozone Season Average Out-Of-Merit-Order Capacity Factor**	**Additional Ozone Season Generation***	**Additional Ozone Season Heat Input (MMBtu)**	**Additional Ozone Season NO_X Emissions (tons)**
Calculation								*C*H*3.672*	*E*I*	*G*J/2000*
Moselle	2070_B_2	59	0	12878	0	0.258	34%	73.66	948,598	122.5

*The formula used to calculate Column I uses a multiplier of 3.672 because there are 3,672 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.

As calculated in Table C.11.b, EPA is assuming that the increase in generation reflecting out-of-merit-order dispatch would be offset by decreasing generation at Mississippi combined cycle units, shown in these calculations as a representative unit with a heat rate (column B) and emission rate (column C) equal to the generation-weighted average of Mississippi combined cycle units.[55] The ozone season NO_X emissions associated with the displaced generation (column D) were calculated by multiplying that generation by the average heat rate and the relevant emission rate at the representative combined cycle unit.

[55] These generation-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Revisions Rule Part II" found in the docket for this rulemaking.

Table C.11.b.: Calculation of Emissions from Displaced Generation at Mississippi Combined Cycle Units				
	A	*B*	*C*	*D*
Program Period	**Displaced Generation (GWh)**	**Heat Rate (BTU/kWh)**	**NO_X Emission Rate (lbs/MMBTU)**	**Displaced NO_X Emissions (tons)**
Calculation				*A*B*C/2000*
Ozone Season	74	7,570	0.026054137	7

The total revision to Mississippi's state budget due to the out-of-merit-order dispatch is calculated in Table C.11.c. The emissions associated with the generation displaced by the out-of-merit-order generation (row B) were subtracted from the increase in emissions due to the out-of-merit-order generation (row A) to determine the net emission budget changes for Mississippi (row C).

Table C.11.c.: Calculation to Determine Net Mississippi Ozone Season NO_X Budget Revisions		
A	Additional Emissions Due to Out-Of-Order-Merit Dispatch	123
B	Displaced Emissions From Out-Of-Order-Merit Dispatch	7
C	**Net Change in Emission budget For Mississippi (A-B)**	**115**

The original and revised values for the state ozone season NO_X budget, assurance level, and new unit set-aside are described in Table C.11.d.

Table C.11.d.: Impact of Mississippi Ozone-Season NO_X Budget Revisions – Assuming Out-of-Merit-Order Dispatch at Three Facilities (tons)

	Budget	Assurance Level		Total New Unit Set-Aside*	
		% of Budget	Tons	% of Budget	Tons
2012 Before Direct Final Revisions Rule	12,314	-	-	2%	246
2012 After Direct Final Revisions Rule	12,429	-	-	2%	249
2014 Before Direct Final Revisions Rule	12,314	12,314	151,634,596	2%	246
2014 After Direct Final Revisions Rule	12,429	12,429	154,480,041	2%	249

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

12) <u>Arkansas</u>

EPA is finalizing, based on comments, an increase to Arkansas's ozone season NO_X budget in 2012 and 2014 to reflect the assumption of near-term operational constraints affecting units at the McClellan plant, based on information provided by the system operator demonstrating that the South Arkansas Region is an out-of-merit-order dispatch area. EPA's analysis in the final Transport Rule did not incorporate the immediate-term local conditions described in recently submitted documentation that appear likely to necessitate non-economic generation at the units displayed below during the implementation of the Transport Rule programs. Specifically, EPA is assuming additional generation will be dispatched the McClellan plant based on the average capacity factor representing the frequency the unit is projected to be called to operate out-of-merit-order, derived from immediate-term dispatch modeling projections provided by Entergy.[56] As discussed later in this section, EPA assumes that the additional generation dispatched from this facility would offset generation that would otherwise come from combined cycle units within the state, and the revision to Arkansas's state budget is based on the net change to projected emissions taking that offsetting factor into account. The net impact of these changes on the state's ozone season NO_X budget is a 73 ton increase.

[56] EPA-HQ-OAR-2009-0491-4820 and Correspondence from Entergy to EPA, September 29, 2011. Please see the document "Transmission System Considerations – Entergy" in the docket for this rule making.

The calculations of the increase in ozone season NO_X emissions due to out-of-merit-order dispatch at McClellan is shown in Table C.12.a. For the unit, the capacity, 2012 emissions from TR_Remedy Final_2012, heat rate, generation from TR_Remedy Final_2012, and emission rate from EPA's NEEDS database are shown (columns A to G). The average out-of-merit-order capacity factor is shown in column H. The additional generation for out-of-merit-order dispatch was calculated by multiplying the capacity, the average out-of-merit-order capacity factor, and the number of hours in the ozone season (column I). The additional heat input required was calculated by multiplying the incremental generation by the unit's heat rate (column J). Finally, the additional emissions associated with the out-of-merit-order generation was calculated by multiplying the additional heat input by the unit's NO_X emission rate.

Table C.12.a.: Calculation to Determine Arkansas Ozone Season NO_X Budget Revisions - Assuming out-of-merit-order dispatch at McClellan

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Ozone Season NO_X Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Ozone Season Generation from TR_Remedy Final_2012 (GWh)**	**Ozone Season NO_X Rate (lbs/MMBtu)**	**Ozone Season Average Out-Of-Merit-Order Capacity Factor**	**Additional Ozone Season Generation***	**Additional Ozone Season Heat Input (MMBtu)**	**Additional Ozone Season NO_X Emissions (tons)**
Calculation								*C*H*3.672*	*E*I*	*G*J/2000*
McClellan	203_B_01	134	0	10901	0	0.20229893	16%	78.73	858,210	86.8

*The formula used to calculate Column I uses a multiplier of 3.672 because there are 3,672 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.

As calculated in Table C.12.b., EPA is assuming that the increase in generation reflecting out-of-merit-order dispatch would be offset by decreasing generation at Arkansas combined cycle units, shown in these calculations as a representative unit with a heat rate (column B) and emission rate (column C) equal to the generation-weighted average of Arkansas combined cycle units.[57] The ozone season NO_X emissions associated with the displaced generation (column D) were calculated by multiplying that generation by the average heat rate and the relevant emission rate at the representative combined cycle unit.

[57] These generation-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Revisions Rule Part II" found in the docket for this rulemaking.

Table C.12.b.: Calculation of Emissions from Displaced Generation at Arkansas Combined Cycle Units				
	A	*B*	*C*	*D*
Program Period	**Displaced Generation (GWh)**	**Heat Rate (BTU/kWh)**	**NO_X Emission Rate (lbs/MMBTU)**	**Displaced NO_X Emissions (tons)**
Calculation				*A*B*C/2000*
Ozone Season	79	7,549	0.044891435	13

The total revision to Arkansas's state budget due to the out-of-merit-order dispatch is calculated in Table C.12.c. The emissions associated with the generation displaced by the out-of-merit-order generation (row B) were subtracted from the increase in emissions due to the out-of-merit-order generation (row A) to determine the net emission budget changes for Arkansas (row C).

Table C.12.c.: Calculation to Determine Net Arkansas Ozone Season NO_X Budget Revisions (tons)		
A	Additional Emissions Due to Out-Of-Order-Merit Dispatch	87
B	Displaced Emissions From Out-Of-Order-Merit Dispatch	13
C	**Net Change in Emission budget For Arkansas (A-B)**	**73**

The original and revised values for the state ozone season NO_X budget, assurance level, and new unit set-aside are described in Table C.12.d.

Table C.12.d.: Impact of Arkansas Ozone-Season NO_X Budget Revisions – Assuming Out-of-Merit-Order Dispatch at McClellan (tons)

	Budget	Assurance Level		Total New Unit Set-Aside*	
		% of Budget	Tons	% of Budget	Tons
2012 Before Direct Final Revisions Rule	15,037	-	-	5%	752
2012 After Direct Final Revisions Rule	15,110	-	-	5%	756
2014 Before Direct Final Revisions Rule	15,037	121%	18,195	5%	752
2014 After Direct Final Revisions Rule	15,110	121%	18,283	8%	1,209

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

13) <u>Texas</u>

EPA is finalizing, based on comments, an increase to Texas's annual and ozone season NO_X budget in 2012 and 2014 to reflect the assumption of near-term operational constraints affecting units at seven plants, based on information provided by the system operator demonstrating these plants are in an out-of-merit-order dispatch area. EPA's analysis in the final Transport Rule did not incorporate the immediate-term local conditions described in recently submitted documentation that appear likely to necessitate non-economic generation at the units displayed below during the implementation of the Transport Rule programs. Specifically, EPA is assuming additional generation will be dispatched at seven plants (Jones, Moore County, Nichols, Plant X, Wilkes, Lone Star, and Knox Lee) based on the average capacity factor representing the frequency the unit is projected to be called to operate out-of-merit-order, derived from immediate-term dispatch modeling projections provided by SPS[58] and AEP.[59] As discussed later in this section, EPA assumes that the

[58] EPA-HQ-OAR-2009-0491-4752 and the document "Clarification of comments originally filed on the TR Revisions Rule by SPS" found in the docket for this rulemaking.
[59] EPA-HQ-OAR-2009-0491-4737, EPA-HQ-OAR-2009-0491-4801, and the document "Clarification of comments originally filed on the TR Revisions Rule by AEP" found in the docket for this rulemaking.

additional generation dispatched from these seven facilities would offset generation that would otherwise come from combined cycle units within the state, and the revision to Texas's state budget is based on the net change to projected emissions taking that offsetting factor into account. The net impact of these changes on the state's annual NO_X and ozone season NO_X budgets are 2,731 and 1,142 ton increases, respectively.

The calculations of the increase in annual NO_X and ozone season NO_X emissions due to out-of-merit-order dispatch at the seven plants is shown in Tables C.13.a. and C.13.b. For each unit with out-of-merit-order dispatch, the capacity, 2012 emissions from TR_Remedy Final_2012, heat rate, generation from TR_Remedy Final_2012, and emission rate from EPA's NEEDS database are shown (columns A to G). The average out-of-merit-order capacity factor is shown in column H. The additional generation for out-of-merit-order dispatch was calculated by multiplying the capacity, the average out-of-merit-order capacity factor, and the number of hours in the ozone season (column I). The additional heat input required was calculated by multiplying the incremental generation by the unit's heat rate (column J). Finally, the additional emissions associated with the out-of-merit-order generation was calculated by multiplying the additional heat input by the unit's NO_X emission rate.

Table C.13.a.: Calculation to Determine Texas Annual NO_X Budget Revisions - Assuming out-of-merit-order dispatch at seven plants

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Annual NO_X Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Annual Generation from TR_Remedy Final_2012 (GWh)**	**Annual NO_X Rate (lbs/MMBtu)**	**Annual Average Out-Of-Merit-Order Capacity Factor**	**Additional Annual Generation***	**Additional Annual Heat Input (MMBtu)**	**Additional Annual NO_X Emissions (tons)**
Calculation								*C*H*8.760*	*E*I*	*G*J/2000*
Jones	3482_B_151B	243	0.17811372	11109	283.774892	0.11	41%	881.00	9,787,029	550.7
Jones	3482_B_152B	243	0.119198228	10245	283.774892	0.08	50%	1069.00	10,951,905	449.5
Moore County	3483_B_3	48	0	14075	0	0.12	20%	82.00	1,154,150	69.4
Nichols	3484_B	107	0.074400425	9983	125.737030	0.12	29%	276.00	2,755,308	162.8

	_141B									
Nichols	3484_B_142B	106	0.07774879	10450	124.561917	0.12	32%	296.00	3,093,200	184.2
Nichols	3484_B_143B	244	0	11682	0	0.16	27%	572.00	6,682,104	548.8
Plant X	3485_B_111B	48	0	16243	0	0.32	23%	98.00	1,591,814	252.5
Plant X	3485_B_112B	102	0	13226	0	0.08	18%	162.00	2,142,612	89.8
Plant X	3485_B_113B	103	0	11484	0	0.17	20%	182.00	2,090,088	173.7
Plant X	3485_B_114B	189	0	10841	0	0.10	53%	881.00	9,550,921	487.0
Knox Lee	3476_B_2	25.0	0	14500	0	0.102	2%	4.80	69,588	3.5
Knox Lee	3476_B_3	25.0	0	14500	0	0.123	3%	6.68	96,879	6.0
Knox Lee	3476_B_4	77.0	0	14933	0	0.311	1%	9.84	146,910	22.9
Knox Lee	3476_B_5	343	0	11669	0	0.174	4%	105.53	1,231,465	107.2
Wilkes	3478_B_1	175	0	12904	0	0.136	11%	176.01	2,271,239	154.5

Lone Star	3477_B_1	50.0	0	14546	0	0.230	5%	22.70	330,223	37.9
Total								**4,824.56**	**53,945,435**	**3,300.56**

*The formula used to calculate Column I uses a multiplier of 8.760 because there are 8.760 hours of possible operation in year; that factor is divided by 1,000 to yield units in GWh.

Table C.13.b.: Calculation to Determine Texas Ozone-Season NO_X Budget Revisions - Assuming out-of-merit-order dispatch at seven plants

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Ozone Season NO_X Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Ozone Season Generation from TR_Remedy Final_2012 (GWh)**	**Ozone Season NO_X Rate (lbs/MMBtu)**	**Ozone Season Average Out-Of-Merit-Order Capacity Factor**	**Additional Ozone Season Generation***	**Additional Ozone Season Heat Input (MMBtu)**	**Additional Ozone Season NO_X Emissions (tons)**
Calculation								*C*H*3.672*	*E*I*	*G*J/2000*
Jones	3482_B_151B	243	0.17811372	11109	283.774892	0.11	31%	273.00	3,032,757	170.6
Jones	3482_B_152B	243	0.119198228	10245	283.774892	0.08	26%	228.00	2,335,860	95.9
Moore County	3483_B_3	48	0	14075	0	0.12	47%	82.00	1,154,150	69.4
Nichols	3484_B_141B	107	0.074400425	9983	125.737030	0.12	17%	65.00	648,895	38.3
Nichols	3484_B_142B	106	0.07774879	10450	124.561918	0.12	17%	68.00	710,600	42.3
Nichols	3484_B_143B	244	0	11682	0	0.16	32%	288.00	3,364,416	276.3

Plant X	3485_B_111B	48	0	16243	0	0.32	30%	52.00	844,636	134.0
Plant X	3485_B_112B	102	0	13226	0	0.08	23%	85.00	1,124,210	47.1
Plant X	3485_B_113B	103	0	11484	0	0.17	30%	112.00	1,286,208	106.9
Plant X	3485_B_114B	189	0	10841	0	0.10	55%	384.00	4,162,944	212.3
Knox Lee	3476_B_2	25.0	0	14500	0	0.102	5%	4.80	69,589	3.5
Knox Lee	3476_B_3	25.0	0	14500	0	0.123	7%	6.68	96,879	6.0
Knox Lee	3476_B_4	77.0	0	14933	0	0.311	3%	7.73	115,448	18.0
Knox Lee	3476_B_5	343	0	11669	0	0.174	4%	46.31	540,447	47.1
Wilkes	3478_B_1	175	0	12904	0	0.136	10%	66.21	854,348	58.1
Lone Star	3477_B_1	50.0	0	14546	0	0.230	12%	22.70	330,223	37.9
Total								**1,791.44**	**20,671,611**	**1,363.79**

*The formula used to calculate Column I uses a multiplier of 3.672 because there are 3,672 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.

As calculated in Table C.13.c., EPA is assuming that the increase in generation reflecting out-of-merit-order dispatch would be offset by decreasing generation at Texas combined cycle units, shown in these calculations as a representative unit with a heat rate (column B) and emission rate (column C) equal to the generation-weighted average of Texas combined cycle units.[60] The ozone season NO_X emissions associated with the displaced generation (column D) were calculated by multiplying that generation by the average heat rate and the relevant emission rate at the representative combined cycle unit.

Table C.13.c.: Calculation of Emissions from Displaced Generation at Texas Combined Cycle Units

	A	*B*	*C*	*D*
Program Period	**Displaced Generation (GWh)**	**Heat Rate (BTU/kWh)**	**NO_X Emission Rate (lbs/MMBTU)**	**Displaced NO_X Emissions (tons)**
Calculation				*A*B*C/2000*
Annual NO_X	4,825	7,405	0.031895983	570
Ozone Season NO_X	1,791	7,464	0.033113058	221

The total revision to Texas's state budget due to the out-of-merit-order dispatch is calculated in Table C.13.d. The emissions associated with the generation displaced by the out-of-merit-order generation (row B) were subtracted from the increase in emissions due to the out-of-merit-order generation (row A) to determine the net emission budget changes for Texas (row C).

Table C.13.d.: Calculation to Determine Net Texas Annual and Ozone Season NO_X Budget Revisions (tons)

		Annual NO_X	Ozone Season NO_X
A	Additional Emissions Due to Out-Of-Order-Merit Dispatch	3,301	1364
B	Displaced Emissions From Out-Of-Order-Merit Dispatch	570	221
C	**Net Change in Emission budget For Texas (A-B)**	**2,731**	**1,142**

[60] These generation-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Revisions Rule Part II" found in the docket for this rulemaking.

The original and revised values for the state ozone season NO_X budget, assurance level, and new unit set-aside are described in Table C.13.e.

Table C.13.e.: Impact of Texas Budget Revisions – Assuming Removed FGDs and Revised FGD Capture at Certain Units, Revised NUSAs for Oak Grove 2, and Out-of-Merit-Order Dispatch at Two Facilities (tons)

			Assurance Level		Total New Unit Set-Aside*	
	Program	Budget	% of Budget	Tons	% of Budget	Tons
2012 Before Direct Final Revisions Rule	SO_2	294,471	-	-	5%	14,724
2012 After Direct Final Revisions Rule	SO_2	294,471	-	-	5%	14,724
2014 Before Direct Final Revisions Rule	SO_2	294,471	118%	347,476	5%	14,724
2014 After Direct Final Revisions Rule	SO_2	294,471	118%	347,476	5%	14,724
2012 Before Direct Final Revisions Rule	Annual NO_X	134,970	-	-	4%	5,399
2012 After Direct Final Revisions Rule	Annual NO_X	137,701	-	-	4%	5,508
2014 Before Direct Final Revisions Rule	Annual NO_X	134,970	118%	159,265	4%	5,399
2014 After Direct Final Revisions Rule	Annual NO_X	137,701	118%	162,487	4%	5,508
2012 Before Direct Final Revisions Rule	Ozone-Season NO_X	64,418	-	-	4%	2,577
2012 After Direct Final Revisions Rule	Ozone-Season NO_X	65,560	-	-	4%	2,622
2014 Before Direct Final Revisions Rule	Ozone-Season NO_X	64,418	121%	77,946	4%	2,577
2014 After Direct Final Revisions Rule	Ozone-Season NO_X	65,560	121%	79,328	4%	2,622

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

14) <u>Kansas</u>

EPA is finalizing, based on comments, an increase to Kansas's SO_2 and NO_X budgets in 2012 and 2014 to reflect the assumption of near-term operational constraints affecting a unit at the Quindaro plant, based on information provided by the system operator demonstrating that the unit serves is an out-of-merit-order dispatch area. EPA's analysis in the final Transport Rule did not incorporate the immediate-term local conditions described in recently submitted documentation that appear likely to necessitate non-economic generation at the units displayed below during the implementation of the Transport Rule programs. Specifically, EPA is assuming additional generation will be dispatched Quindaro unit 1 based on the annual minimum capacity factor representing the frequency the unit is projected to be called to operate out-of-merit-order, provided in comments from Kansas City Board of Public Utilities.[61] In the model run TR_Remedy Final_2012, this unit ran at approximately a 55% annual capacity factor. KCBPU's comments showed that the unit must operate at an average annual capacity factor of 75% to serve its load. Therefore, the difference of 20% is being considered out-of-merit-order dispatch in this case. As discussed later in this section, EPA assumes that the additional generation dispatched from this facility would offset generation that would otherwise come from similarly-positioned coal-fired units within the state, and the revision to Kansas's state budget is based on the net change to projected emissions taking that offsetting factor into account. The net impact of these changes on the state's SO_2 and annual NO_X budgets are 452 and 640 ton increases, respectively.

The calculations of the increase in SO_2 and annual NO_X emissions due to out-of-merit-order dispatch at Quindaro unit 1 is shown in Tables C.14.a. and C.14.b. For the unit, the capacity, 2012 emissions from TR_Remedy Final_2012, heat rate, generation from TR_Remedy Final_2012, and emission rate from EPA's NEEDS database are shown (columns A to G). The average out-of-merit-order capacity factor is shown in column H. The additional generation for out-of-merit-order dispatch was calculated by multiplying the capacity, the average out-of-merit-order capacity factor, and the number of hours in the ozone season (column I). The additional heat input required was calculated by multiplying the incremental generation by the unit's heat rate (column J). Finally, the additional emissions associated with the out-of-merit-order generation was calculated by multiplying the additional heat input by the unit's NO_X emission rate.

[61] EPA-HQ-OAR-2009-0491-4779 and the document "Clarification of comments originally filed on the TR Revisions Rule by KC BPU" found in the docket for this rulemaking.

Table C.14.a.: Calculation to Determine Kansas SO_2 Budget Revisions - Assuming out-of-merit-order dispatch at Quindaro unit 1										
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Annual SO_2 Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Annual Generation from TR_Remedy Final_2012 (GWh)**	**Annual SO_2 Rate (lbs/MMBtu)**	**Annual Average Out-Of-Merit-Order Capacity Factor**	**Additional Annual Generation***	**Additional Annual Heat Input (MMBtu)**	**Additional Annual SO_2 Emissions (tons)**
Calculation								*C*H*8.760*	*E*I*	*G*J/2000*
Quindaro	1295_B_1	72	1.170152332	11673	345.6701925	0.579999983	33.8%	212.87	2,484,808	720.6
*The formula used to calculate Column I uses a multiplier of 8.760 because there are 8.760 hours of possible operation in the year; that factor is divided by 1,000 to yield units in GWh.										

Table C.14.b.: Calculation to Determine Kansas Annual NO_X Budget Revisions - Assuming out-of-merit-order dispatch at Quindaro unit 1										
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Annual NO_X Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Annual Generation from TR_Remedy Final_2012 (GWh)**	**Annual NO_X Rate (lbs/MMBtu)**	**Annual Average Out-Of-Merit-Order Capacity Factor**	**Additional Annual Generation***	**Additional Annual Heat Input (MMBtu)**	**Additional Annual NO_X Emissions (tons)**
Calculation								*C*H*3.672*	*E*I*	*G*J/2000*
Quindaro	1295_B_1	72	1.355762723	11673	345.670193	0.67182472	33.8%	212.87	2,484,808	834.7
*The formula used to calculate Column I uses a multiplier of 3.672 because there are 3,672 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.										

As calculated in Table C.14.c., EPA is assuming that the increase in generation reflecting out-of-merit-order dispatch would be offset by decreasing generation at other Kansas coal units, shown in these calculations as a representative unit with a heat rate (column B) and emission rate (column C) equal to the generation-weighted average of Kansas coal units.[62] The ozone season NO_X emissions associated with the displaced generation (column D) were calculated by multiplying that generation by the average heat rate and the relevant emission rate at the representative coal unit. EPA used representative

[62] These generation-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Revisions Rule Part II" found in the docket for this rulemaking.

coal-fired generation to offset the additional generation assumed now to occur at Quindaro unit 1 because it is reasonable to assume that increased baseload generation at Quindaro unit 1 would displace similarly-positioned baseload coal-fired generation previously projected to meet electricity demand.[63]

Table C.14.c.: Calculation of Emissions from Displaced Generation at Kansas Coal Units				
	A	*B*	*C*	*D*
Program Period	**Displaced Generation (GWh)**	**Heat Rate (BTU/kWh)**	**Displaced Generation Emission Rate (lbs/MMBTU)**	**Displaced Emissions (tons)**
Calculation				*A*B*C/2000*
SO_2	213	10,707	0.23598	269
Annual NO_X	213	10,707	0.170752	195

The total revision to Kansas's state budget due to the out-of-merit-order dispatch is calculated in Table C.14.d. The emissions associated with the generation displaced by the out-of-merit-order generation (row B) were subtracted from the increase in emissions due to the out-of-merit-order generation (row A) to determine the net emission budget changes for Kansas (row C).

Table C.14.d.: Calculation to Determine Net Kansas SO_2 and Annual NO_XNO_X Budget Revisions (tons)					
		2012		**2014**	
		SO_2	**Annual NO_X**	**SO_2**	**Annual NO_X**
A	Emissions Due to Out-Of-Merit-Order Generation	721	835	721	835
B	Displaced Emissions from Out-Of-Merit-Order Generation at Quindaro	269	195	269	195
C	**Net Budget Revisions for Kansas (A-B)**	**452**	**640**	**452**	**640**

[63] In addition, whereas EPA has made similar revisions affecting oil/gas steam units to other state budgets by offsetting previously projected natural gas-fired combined cycle generation, there are no gas-fired combined cycles in the state of Kansas that could serve as candidates for this calculation. EPA believes the calculation as demonstrated above, using representative coal-fired generation as a broad match for the dispatch characteristics of the assumed increase in out-of-merit-order dispatch at Quindaro unit 1, maintains a consistent approach with the other revisions of this type made to Transport Rule state budgets.

The total budget revisions for Kansas are summarized below in Table C.14.e.

Table C.14.e.: Total Budget Revisions for Kansas				
Budget	**Year**	**Revisions due to Out-of-Merit-Order Dispatch**	**Revisions due to Unit Controls**	**Total Change**
SO_2	2012	452	--	452
SO_2	2014	452	--	452
Annual NO_X	2012	640	--	640
Annual NO_X	2014	640	5,154	5,794

The original and revised values for the state budgets, assurance levels, and new unit set-asides are described in Table C.14.f.

Table C.14.f.: Impact of Kansas Budget Revisions – for Out-Of-Merit-Order Dispatch and Unit Controls						
			Assurance Level		Total New Unit Set-Aside*	
	Program	Budget	% of Budget	Tons	% of Budget	Tons
2012 Before Direct Final Revisions Rule	SO_2	41,528	-	-	2%	831
2012 After Direct Final Revisions Rule	SO_2	41,980	-	-	2%	840
2014 Before Direct Final Revisions Rule	SO_2	41,528	118%	49,003	2%	831
2014 After Direct Final Revisions Rule	SO_2	41,980	118%	49,536	2%	840
2012 Before Direct Final Revisions Rule	Annual NO_X	30,714	-	-	2%	614
2012 After Direct Final Revisions Rule	Annual NO_X	31,354	-	-	2%	627
2014 Before Direct Final Revisions Rule	Annual NO_X	25,560	118%	30,161	2%	511
2014 After Direct Final Revisions Rule	Annual NO_X	31,354	118%	36,998	2%	627

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

15) Missouri

EPA is finalizing, based on comments, an increase to Missouri's annual and ozone season NO_X budget in 2012 and 2014 to reflect the assumption of near-term operational constraints affecting units at four plants, based on information provided by the system operator demonstrating that these units are called to dispatch out-of-merit-order to provide voltage support and regulation. EPA's analysis in the final Transport Rule did not incorporate the immediate-term local conditions described in recently submitted documentation that appear likely to necessitate non-economic generation at the units displayed below during the implementation of the Transport Rule programs. Specifically, EPA is assuming additional generation will be dispatched at four plants (Hawthorn, Greenwood, Ralph Green, and South Harper) based on the average capacity factor representing the frequency the unit has recently been called on to operate out of merit order, calculated from dispatch logbook data provided by KCPL.[64] As discussed later in this section, EPA assumes that the additional generation dispatched from these four facilities would offset generation that would otherwise come from combined cycle units within the state, and the revision to Missouri's state budget is based on the net change to projected emissions taking that offsetting factor into account. The net impact of these changes on the state's annual and ozone season NO_X budget are 26 ton increases each.

The calculations of the increase in annual and ozone season NO_X emissions due to out-of-merit-order dispatch at the four facilities is shown in Tables C.15.a. and C.15.b. For each unit with out-of-merit-order dispatch, the capacity, 2012 emissions from TR_Remedy Final_2012, heat rate, generation from TR_Remedy Final_2012, and emission rate from EPA's NEEDS database are shown (columns A to G). The average out-of-merit-order capacity factor is shown in column H. The additional generation for out-of-merit-order dispatch was calculated by multiplying the capacity, the average out-of-merit-order capacity factor, and the number of hours in the ozone season (column I). The additional heat input required was calculated by multiplying the incremental generation by the unit's heat rate (column J). Finally, the additional emissions associated with the out-of-merit-order generation was calculated by multiplying the additional heat input by the unit's NO_X emission rate.

[64] EPA-HQ-OAR-2009-0491-4826 and the document "Clarification of comments originally filed on the TR Revisions Rule by KCPL" found in the docket for this rulemaking.

Table C.15.a.: Calculation to Determine Missouri Annual NO_X Budget Revisions - Assuming out-of-merit-order dispatch at four plants										
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Annual NO_X Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Annual Generation from TR_Remedy Final_2012 (GWh)**	**Annual NO_X Rate (lbs/MMBtu)**	**Annual Average Out-Of-Merit-Order Capacity Factor**	**Additional Annual Generation***	**Additional Annual Heat Input (MMBtu)**	**Additional Annual NO_X Emissions (tons)**
Calculation								*C*H*8.760*	*E*I*	*G*J/2000*
Hawthorn	2079_G_7	77	0	13180	0	0.03072543	0.06%	0.39	5,074	0.1
Hawthorn	2079_G_8	77	0	16770	0	0.03190992	0.14%	0.97	16,233	0.3
Greenwood	6074_G_1	58	0	13300	0	0.50105250	0.31%	1.55	20,615	5.2
Greenwood	6074_G_2	58	0	13300	0	0.50105250	0.23%	1.16	15,388	3.9
Greenwood	6074_G_3	58	0	13300	0	0.50105250	0.35%	1.77	23,541	5.9
Greenwood	6074_G_4	58	0	13300	0	0.50105250	0.28%	1.40	18,673	4.7
Ralph Green	2092_G_3	71	0	14322	0	0.50105250	0.02%	0.14	2,048	0.5
South Harper	56151_G_GT1	105	0	15250	0	0.05518069	0.54%	4.99	76,159	2.1
South Harper	56151_G_GT2	105	0	15082	0	0.05490044	0.81%	7.47	112,632	3.1
South Harper	56151_G_GT3	105	0	15250	0	0.05578315	0.48%	4.39	66,871	1.9
Total								**24.22**	**357,235**	**27.5**

*The formula used to calculate Column I uses a multiplier of 8.760 because there are 8.760 hours of possible operation in year; that factor is divided by 1,000 to yield units in GWh.

Table C.15.b.: Calculation to Determine Missouri Ozone Season NO_X Budget Revisions - Assuming out-of-merit-order dispatch at four plants										
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Ozone Season NO_X Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Ozone Season Generation from TR_Remedy Final_2012 (GWh)**	**Ozone Season NO_X Rate (lbs/MMBtu)**	**Ozone Season Average Out-Of-Merit-Order Capacity Factor**	**Additional Ozone Season Generation***	**Additional Ozone Season Heat Input (MMBtu)**	**Additional Ozone Season NO_X Emissions (tons)**
Calculation								*C*H*3.762*	*E*I*	*G*J/2000*
Hawthorn	2079_G_7	77	0	13180	0	0.03072543	0.14%	0.39	5,074	0.1
Hawthorn	2079_G_8	77	0	16770	0	0.03190992	0.34%	0.97	16,233	0.3
Greenwood	6074_G_1	58	0	13300	0	0.50105250	0.73%	1.55	20,615	5.2
Greenwood	6074_G_2	58	0	13300	0	0.50105250	0.54%	1.16	15,388	3.9
Greenwood	6074_G_3	58	0	13300	0	0.50105250	0.83%	1.77	23,541	5.9
Greenwood	6074_G_4	58	0	13300	0	0.50105250	0.66%	1.40	18,673	4.7
Ralph Green	2092_G_3	71	0	14322	0	0.50105250	0.05%	0.14	2,048	0.5
South Harper	56151_G_GT1	105	0	15250	0	0.05518069	1.30%	4.99	76,159	2.1
South Harper	56151_G_GT2	105	0	15082	0	0.05490044	1.94%	7.47	112,632	3.1
South Harper	56151_G_GT3	105	0	15250	0	0.05578315	1.14%	4.39	66,871	1.9
Total								**24.22**	**357,235**	**27.5**
*The formula used to calculate Column I uses a multiplier of 3.672 because there are 3,672 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.										

As calculated in Table C.15.c., EPA is assuming that the increase in generation reflecting out-of-merit-order dispatch would be offset by decreasing generation at Missouri combined cycle units, shown in these calculations as a representative unit with a heat rate (column B) and emission rate (column C) equal to the generation-weighted average of Missouri combined cycle units.[65] The ozone season NO_X emissions associated with the displaced generation (column D) were calculated by multiplying that generation by the average heat rate and the relevant emission rate at the representative combined cycle unit.

[65] These generation-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Revisions Rule Part II" found in the docket for this rulemaking.

Table C.15.c.: Calculation of Emissions from Displaced Generation at Missouri Combined Cycle Units				
	A	*B*	*C*	*D*
Program Period	**Displaced Generation (GWh)**	**Heat Rate (BTU/kWh)**	**NO_X Emission Rate (lbs/MMBTU)**	**Displaced NO_X Emissions (tons)**
Calculation				*A*B*C/2000*
Annual	24	8,049	0.018330584	2
Ozone Season	24	8,079	0.018315387	2

The total revision to Missouri's state budget due to the out-of-merit-order dispatch is calculated in Table C.15.d. The emissions associated with the generation displaced by the out-of-merit-order generation (row B) were subtracted from the increase in emissions due to the out-of-merit-order generation (row A) to determine the net emission budget changes for Missouri (row C).

Table C.15.d.: Calculation to Determine Net Missouri and Ozone Season NO_X Budget Revisions (tons)					
		2012		**2014**	
		Annual NO_X	**Ozone Season NO_X**	**Annual NO_X**	**Ozone Season NO_X**
A	Emissions Due to Out-Of-Merit-Order Generation	28	28	28	28
B	Displaced Emissions from Out-Of-Merit-Order Generation	2	2	2	2
C	**Net Budget Revisions for Missouri (A-B)**	**26**	**26**	**26**	**26**

The original and revised values for the state ozone season NO_X budget, assurance level, and new unit set-aside are described in Table C.15.e.,which includes the adjustments to Missouri's new unit set aside described in section 10.

Table C.15.e.: Impact of Missouri Budget Revisions for Out-Of-Merit-Order Dispatch and New Unit Set-Aside

			Assurance Level		Total New Unit Set-Aside*	
	Program	Budget	% of Budget	Tons	% of Budget	Tons
2012 Before Direct Final Revisions Rule	SO_2	207,466	-	-	2%	4,149
2012 After Direct Final Revisions Rule	SO_2	207,466	-	-	2%	4,149
2013 Before Direct Final Revisions Rule	SO_2	207,466	-	-	2%	4,149
2013 After Direct Final Revisions Rule	SO_2	207,466	-	-	3%	6,224
2014 Before Direct Final Revisions Rule	SO_2	165,941	118%	195,810	2%	3,319
2014 After Direct Final Revisions Rule	SO_2	165,941	118%	195,810	3%	4,978
2012 Before Direct Final Revisions Rule	Annual NO_X	52,374	-	-	3%	1,571
2012 After Direct Final Revisions Rule	Annual NO_X	52,400	-	-	3%	1,572
2013 Before Direct Final Revisions Rule	Annual NO_X	52,374	-	-	3%	1,571
2013 After Direct Final Revisions Rule	Annual NO_X	52,400	-	-	6%	3,144
2014 Before Direct Final Revisions Rule	Annual NO_X	48,717	118%	57,486	3%	1,462
2014 After Direct Final Revisions Rule	Annual NO_X	48,743	118%	57,517	6%	2,925
2012 Before Direct Final Revisions Rule	Ozone-Season NO_X	22,762	-	-	3%	683
2012 After Direct Final Revisions Rule	Ozone-Season NO_X	22,788	-	-	3%	684
2013 Before Direct Final Revisions Rule	Ozone-Season NO_X	22,762	-	-	3%	683
2013 After Direct Final Revisions Rule	Ozone-Season NO_X	22,788	-	-	6%	1,367
2014 Before Direct Final Revisions Rule	Ozone-Season NO_X	21,073	121%	25,498	3%	632
2014 After Direct Final Revisions Rule	Ozone-Season NO_X	21,099	121%	25,530	6%	1,266

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

16) Oklahoma

EPA is finalizing, based on comments, an increase to Oklahoma's ozone season NO_X budget in 2013 and 2014 to reflect the assumption of near-term operational constraints affecting units at four plants, based on information provided by the system operator demonstrating these plants are in an out-of-merit-order dispatch area. These changes do not apply to Oklahoma's 2012 budget because similar changes were already made to the affected units' operation in 2012, as described in the Technical Support Document "Determination of State Budgets for the Final Ozone Supplemental of the Transport Rule."[66] EPA's analysis in the final Transport Rule did not incorporate the immediate-term local conditions described in recently submitted documentation that appear likely to necessitate non-economic generation at the units displayed below during the implementation of the Transport Rule programs. Specifically, EPA is assuming additional generation will be dispatched at four plants (Northeastern, Riverside , Southwestern, and Tulsa) based on the average capacity factor representing the frequency the unit is projected to be called to operate out-of-merit-order, derived from immediate-term dispatch modeling projections provided by AEP.[67] As discussed later in this section, EPA assumes that the additional generation dispatched from these facilities would offset generation that would otherwise come from combined cycle units within the state, and the revision to Oklahoma's state budget is based on the net change to projected emissions taking that offsetting factor into account. The net impact of these changes on the state's ozone season NO_X budget is an 859 ton increase.

The calculations of the increase in ozone season NO_X emissions due to out-of-merit-order dispatch at these facilities is shown in Table C.16.a. For each unit with out-of-merit-order dispatch, the capacity, 2012 emissions from TR_Remedy Final_2012, heat rate, generation from TR_Remedy Final_2012, and emission rate from EPA's NEEDS database are shown (columns A to G). The average out-of-merit-order capacity factor is shown in column H. The additional generation for out-of-merit-order dispatch was calculated by multiplying the capacity, the average out-of-merit-order capacity factor, and the number of hours in the ozone season (column I). The additional heat input required was calculated by multiplying the incremental generation by the unit's heat rate (column J). Finally, the additional emissions associated with the out-of-merit-order generation was calculated by multiplying the additional heat input by the unit's NO_X emission rate.

[66] EPA-HQ-OAR-2009-0491-485, pg 5-7.
[67] EPA-HQ-OAR-2009-0491-4737, EPA-HQ-OAR-2009-0491-4801, and the document "Clarification of comments originally filed on the TR Revisions Rule by AEP" found in the docket for this rulemaking.

Table C.16.a.: Calculation to Determine Oklahoma Ozone Season NO_X Budget Revisions - Assuming Out-of-Merit-Order Dispatch at Four Plants										
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Ozone Season NO_X Emissions from TR_ Remedy Final_ 2012 (1000 tons)**	**Heat Rate (BTU/ kWh)**	**Ozone Season Generation from TR_ Remedy Final_2012 (GWh)**	**Ozone Season NO_X Rate (lbs/MMBtu)**	**Ozone Season Average Out-Of-Merit-Order Capacity Factor**	**Additional Ozone Season Generation ***	**Additional Ozone Season Heat Input (MMBtu)**	**Additional Ozone Season NO_X Emissions (tons)**
Calculation								*C*H*3.672*	*E*I*	*G*J/2000*
Northeastern	2963_B_3302	480	0	10442	0	0.396	17.1%	301.00	3,143,054	622.6
Riverside	4940_B_1502	459	0	11094	0	0.226	8.2%	137.75	1,528,240	172.8
Southwestern	2964_B_801 N	40.0	0	20500	0	0.251	0.7%	1.02	20,862	2.6
Southwestern	2964_B_801S	40.0	0	20500	0	0.206	0.7%	1.02	20,862	2.1
Southwestern	2964_B_8002	80.0	0	11900	0	0.326	2.1%	6.26	74,476	12.1
Southwestern	2964_B_8003	311	0	11611	0	0.436	1.6%	17.75	206,123	45.0
Tulsa	2965_B_1402	165	0	14213	0	0.182	1.7%	10.33	146,755	13.4
Tulsa	2965_B_1403	85.0	0	11163	0	0.276	1.6%	4.89	54,611	7.5
Tulsa	2965_B_1404	165	0	13144	0	0.188	5.8%	35.06	460,825	43.3
Total								**515.08**	**5,655,808**	**921.42**
***The formula used to calculate Column I uses a multiplier of 3.672 because there are 3,672 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.										

As calculated in Table C.16.b., EPA is assuming that the increase in generation reflecting out-of-merit-order dispatch would be offset by decreasing generation at Oklahoma combined cycle units, shown in these calculations as a representative unit with a heat rate (column B) and emission rate (column C)

equal to the generation-weighted average of Oklahoma combined cycle units.[68] The ozone season NO_X emissions associated with the displaced generation (column D) were calculated by multiplying that generation by the average heat rate and the relevant emission rate at the representative combined cycle unit.

Table C.16.b.: Calculation of Emissions from Displaced Generation at Oklahoma Combined Cycle Units				
	A	*B*	*C*	*D*
Program Period	**Displaced Generation (GWh)**	**Heat Rate (BTU/kWh)**	**NO_X Emission Rate (lbs/MMBTU)**	**Displaced NO_X Emissions (tons)**
Calculation				*A*B*C/2000*
Ozone Season	515	7,713	0.031566434	63

The total revision to Oklahoma's state budget due to the out-of-merit-order dispatch is calculated in Table C.16.c. The emissions associated with the generation displaced by the out-of-merit-order generation (row B) were subtracted from the increase in emissions due to the out-of-merit-order generation (row A) to determine the net emission budget changes for Oklahoma (row C).

Table C.16.c.: Calculation to Determine Net Oklahoma Ozone Season NO_X Budget Revisions (tons)		
A	Additional Emissions Due to Out-Of-Order-Merit Dispatch	921
B	Displaced Emissions From Out-Of-Order-Merit Dispatch	63
C	**Net Change in Emission budget For Oklahoma (A-B)**	**859**

[68] These generation-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Revisions Rule Part II" found in the docket for this rulemaking.

The original and revised values for the state ozone season NO_X budget, assurance level, and new unit set-aside are described in Table C.16.d.

Table C.16.d.: Impact of Oklahoma Ozone-Season NO_X Budget Revisions – Assuming Out-of-Merit-Order Dispatch at Three Facilities (tons)

	Budget	Assurance Level		Total New Unit Set-Aside*	
		% of Budget	Tons	% of Budget	Tons
2012 Before Direct Final Revisions Rule	36,567	-	-	2%	731
2012 After Direct Final Revisions Rule	36,567	-	-	2%	731
2013 Before Direct Final Revisions Rule	21,835	-	-	2%	437
2013 After Direct Final Revisions Rule	22,694	-	-	2%	454
2014 Before Direct Final Revisions Rule	21,835	121%	26,420	2%	437
2014 After Direct Final Revisions Rule	22,694	121%	27,460	2%	454

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

17) Louisiana

EPA is finalizing, based on comments, an increase to Louisiana's ozone season NO_X budget in 2012 and 2014 to reflect the assumption of near-term operational constraints affecting units at two plants, based on information provided by the system operator demonstrating these plants are in an out-of-merit-order dispatch area. EPA's analysis in the final Transport Rule did not incorporate the immediate-term local conditions described in recently submitted documentation that appear likely to necessitate non-economic generation at the units displayed below during the implementation of the Transport Rule programs. Specifically, EPA is assuming additional generation will be dispatched at two plants based on the average capacity factor representing the frequency the unit is projected to be called to operate out-of-merit-order, derived from immediate-term dispatch modeling projections provided by AEP.[69] As discussed later in this section, EPA assumes that the additional generation dispatched from these facilities would offset generation that would otherwise

[69] EPA-HQ-OAR-2009-0491-4737, EPA-HQ-OAR-2009-0491-4801, and the document "Clarification of comments originally filed on the TR Revisions Rule by AEP" found in the docket for this rulemaking.

come from combined cycle units within the state, and the revision to Louisiana's state budget is based on the net change to projected emissions taking that offsetting factor into account. The net impact of these changes on the state's ozone season NO_X budget is a 89 ton increase.

The calculations of the increase in ozone season NO_X emissions due to out-of-merit-order dispatch at these facilities is shown in Table C.17.a. For each unit with out-of-merit-order dispatch, the capacity, 2012 emissions from TR_Remedy Final_2012, heat rate, generation from TR_Remedy Final_2012, and emission rate from EPA's NEEDS database are shown (columns A to G). The average out-of-merit-order capacity factor is shown in column H. The additional generation for out-of-merit-order dispatch was calculated by multiplying the capacity, the average out-of-merit-order capacity factor, and the number of hours in the ozone season (column I). The additional heat input required was calculated by multiplying the incremental generation by the unit's heat rate (column J). Finally, the additional emissions associated with the out-of-merit-order generation was calculated by multiplying the additional heat input by the unit's NO_X emission rate.

Table C.17.a.: Calculation to Determine Louisiana Ozone Season NO_X Budget Revisions - Assuming out-of-merit-order dispatch at two plants

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Ozone Season NO_X Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Ozone Season Generation from TR_Remedy Final_2012 (GWh)**	**Ozone Season NO_X Rate (lbs/MMBtu)**	**Ozone Season Average Out-Of-Merit-Order Capacity Factor**	**Additional Ozone Season Generation***	**Additional Ozone Season Heat Input (MMBtu)**	**Additional Ozone Season NO_X Emissions (tons)**
Calculation								*C*H*3.672*	*E*I*	*G*J/2000*
J. Lamar Stall Unit at Arsenal Hill	1416_B_5A	110	0	15,702	0	0.092	3%	11.82	185,573	8.6
Lieberman	1417_B_1	25.0	0	14,983	0	0.420	5%	4.20	63,002	13.2
Lieberman	1417_B_2	25.0	0	14,546	0	0.420	6%	5.41	78,671	16.5
Lieberman	1417_B_3	111	0	12,334	0	0.124	11%	46.52	573,748	35.6
Lieberman	1417_B_4	109	0	12,791	0	0.132	8%	32.14	411,051	27.1
Total								**100.09**	**1312044.7**	**100.98**

*The formula used to calculate Column I uses a multiplier of 3.672 because there are 3,672 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.

As calculated in Table C.17.b., EPA is assuming that the increase in generation reflecting out-of-merit-order dispatch would be offset by decreasing generation at Louisiana combined cycle units, shown in these calculations as a representative unit with a heat rate (column B) and emission rate (column C) equal to the generation-weighted average of Louisiana combined cycle units.[70] The ozone season NO_X emissions associated with the displaced generation (column D) were calculated by multiplying that generation by the average heat rate and the relevant emission rate at the representative combined cycle unit.

Table C.17.b.: Calculation of Emissions from Displaced Generation at Louisiana Combined Cycle Units				
	A	*B*	*C*	*D*
Program Period	**Displaced Generation (GWh)**	**Heat Rate (BTU/kWh)**	**NO_X Emission Rate (lbs/MMBTU)**	**Displaced NO_X Emissions (tons)**
Calculation				*A*B*C/2000*
Ozone Season	100	7,480	0.031765081	12

The total revision to Louisiana's state budget due to the out-of-merit-order dispatch is calculated in Table C.17.c. The emissions associated with the generation displaced by the out-of-merit-order generation (row B) were subtracted from the increase in emissions due to the out-of-merit-order generation (row A) to determine the net emission budget changes for Louisiana (row C).

Table C.17.c.: Calculation to Determine Net Louisiana Ozone Season NO_X Budget Revisions (tons)		
A	Additional Emissions Due to Out-Of-Order-Merit Dispatch	101
B	Displaced Emissions From Out-Of-Order-Merit Dispatch	12
C	**Net Change in Emission budget For Louisiana (A-B)**	**89**

[70] These generation-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Revisions Rule Part II" found in the docket for this rulemaking.

The original and revised values for the state ozone season NO_X budget, assurance level, and new unit set-aside are described in Table C.17.d.

Table C.17.d.: Impact of Louisiana Ozone-Season NO_X Budget Revisions – Assuming Out-of-Merit-Order Dispatch at Three Facilities (tons)

		Assurance Level		Total New Unit Set-Aside*	
	Budget	% of Budget	Tons	% of Budget	Tons
2012 Before Direct Final Revisions Rule	18,026	-	-	3%	541
2012 After Direct Final Revisions Rule	18,115	-	-	2%	362
2014 Before Direct Final Revisions Rule	18,026	121%	21,811	3%	541
2014 After Direct Final Revisions Rule	18,115	121%	21,919	2%	362

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

18) <u>Ohio</u>

EPA is finalizing, based on comments, an increase to Ohio's SO_2, annual NO_X, and ozone season NO_X budget in 2012 and 2014 to reflect the assumption of near-term operational constraints affecting Muskingum River unit 1, based on information provided by the system operator demonstrating the plant operates out-of-merit-order. EPA's analysis in the final Transport Rule did not incorporate the immediate-term local conditions described in recently submitted documentation that appear likely to necessitate non-economic generation at the units displayed below during the implementation of the Transport Rule programs. EPA is assuming additional generation will be dispatched from Muskingum River unit 1 based on operational constraints provided by AEP.[71] As discussed later in this section, EPA assumes that the additional generation dispatched from this facilities would offset generation that would otherwise come from combined cycle units within the state, and the revision to Ohio's state budget is based on the net change to projected emissions taking that offsetting factor into account. The net impact of these changes on the state's SO_2, annual NOX, and ozone season NO_X budget are 5,163 ton, 528 ton, and 247 ton increases, respectively.

[71] EPA-HQ-OAR-2009-0491-4737, EPA-HQ-OAR-2009-0491-4801, and the document "Clarification of comments originally filed on the TR Revisions Rule by AEP" found in the docket for this rulemaking.

The calculations of the increase in SO_2, annual NO_X, and ozone season NO_X emissions due to out-of-merit-order dispatch at this facility are shown in Tables C.18.a., C.18.b., and C.18.c. For each unit with out-of-merit-order dispatch, the capacity, 2012 emissions from TR_Remedy Final_2012, heat rate, generation from TR_Remedy Final_2012, and emission rate from EPA's NEEDS database are shown (columns A to G). The average out-of-merit-order capacity factor is shown in column H. The additional generation for out-of-merit-order dispatch was calculated by multiplying the capacity, the average out-of-merit-order capacity factor, and the number of hours in the ozone season (column I). The additional heat input required was calculated by multiplying the incremental generation by the unit's heat rate (column J). Finally, the additional emissions associated with the out-of-merit-order generation was calculated by multiplying the additional heat input by the unit's NO_X emission rate.

Table C.18.a.: Calculation to Determine Ohio SO_2 Budget Revisions - Assuming out-of-merit-order dispatch at Muskingum River

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Annual SO_2 Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Annual Generation from TR_Remedy Final_2012 (GWh)**	**Annual SO_2 Rate (lbs/MMBtu)**	**Annual Average Out-Of-Merit-Order Capacity Factor**	**Additional Annual Generation***	**Additional Annual Heat Input (MMBtu)**	**Additional Annual SO_2 Emissions (tons)**
Calculation								*C*H*8.760*	*E*I*	*G*J/2000*
Muskingum River	2872_B_1	190	0	10416	0	4.36	14%	227.39	2,368,533	5163.4

*The formula used to calculate Column I uses a multiplier of 8.760 because there are 8,760 hours of possible operation in the year; that factor is divided by 1,000 to yield units in GWh.

**SO_2 rates were derived assuming a similar grade of coal as was used by comparable units in IPM in that region of Ohio and the SO_2 content of coal in chapter 8 of the documentation for IPM. The resulting SO_2 rates are similar to historic rates at these units.

Table C.18.b.: Calculation to Determine Ohio Annual NO_X Budget Revisions - Assuming out-of-merit-order dispatch at Muskingum River plants										
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Annual NO_X Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Annual Generation from TR_Remedy Final_2012 (GWh)**	**Annual NO_X Rate (lbs/MMBtu)**	**Annual Average Out-Of-Merit-Order Capacity Factor**	**Additional Annual Generation***	**Additional Annual Heat Input (MMBtu)**	**Additional Annual NO_X Emissions (tons)**
Calculation								*C*H*8.760*	*E*I*	*G*J/2000*
Muskingum River	2872_B_1	190	0	10416	0	0.46	14%	227.39	2,368,533	547.1
*The formula used to calculate Column I uses a multiplier of 8.760 because there are 8.760 hours of possible operation in the year; that factor is divided by 1,000 to yield units in GWh.										

Table C.18.c.: Calculation to Determine Ohio Ozone-Season NO_X Budget Revisions - Assuming out-of-merit-order dispatch at Muskingum River plants										
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Ozone Season NO_X Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Ozone Season Generation from TR_Remedy Final_2012 (GWh)**	**Ozone Season NO_X Rate (lbs/MMBtu)**	**Ozone Season Average Out-Of-Merit-Order Capacity Factor**	**Additional Ozone Season Generation***	**Additional Ozone Season Heat Input (MMBtu)**	**Additional Ozone Season NO_X Emissions (tons)**
Calculation								*C*H*3.672*	*E*I*	*G*J/2000*
Muskingum River	2872_B_1	190	0	10416	0	0.46	15%	106.71	1,111,521	256.8
*The formula used to calculate Column I uses a multiplier of 3.672 because there are 3,672 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.										

As calculated in Table C.18.d., EPA is assuming that the increase in generation reflecting out-of-merit-order dispatch would be offset by decreasing generation at Ohio combined cycle units, shown in these calculations as a representative unit with a heat rate (column B) and emission rate (column C) equal

to the generation-weighted average of Ohio combined cycle units.[72] The ozone season NO_X emissions associated with the displaced generation (column D) were calculated by multiplying that generation by the average heat rate and the relevant emission rate at the representative combined cycle unit.

Table C.18.d.: Calculation of Emissions from Displaced Generation at Ohio Combined Cycle Units

	A	*B*	*C*	*D*
Program Period	**Displaced Generation (GWh)**	**Heat Rate (BTU/kWh)**	**Emission Rate (lbs/MMBTU)**	**Displaced Emissions (tons)**
Calculation				*A*B*C/2000*
SO_2	227	7,191	0	0
Annual NO_X	227	7,191	0.023597394	19
Ozone Season NO_X	107	7,265	0.026009641	10

The total revision to Ohio's state budget due to the out-of-merit-order dispatch is calculated in Table C.18.e. The emissions associated with the generation displaced by the out-of-merit-order generation (row B) were subtracted from the increase in emissions due to the out-of-merit-order generation (row A) to determine the net emission budget changes for Ohio (row C).

[72] These generation-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Revisions Rule Part II" found in the docket for this rulemaking.

Table C.18.e.: Calculation to Determine Net Ohio SO_2, Annual NO_X, and Ozone Season NO_X Budget Revisions (tons)							
		2012			2014		
		SO_2	Annual NO_X	Ozone Season NO_X	SO_2	Annual NO_X	Ozone Season NO_X
A	Additional Emissions Due to Out-Of-Merit-Order Generation	5,163	547	257	5,163	547	257
B	Displaced Emissions from Out-Of-Merit-Order Generation	0	19	10	0	19	10
C	**Net Budget Revisions for Ohio (A-B)**	**5,163**	**528**	**247**	**5,163**	**528**	**247**

The total revisions to Ohio's budgets as a result of control and out-of-merit-order dispatch revisions are summarized below in Table C.18.f.

Table C.18.f.: Total Budget Revisions for Ohio (tons)				
Budget	**Year**	**Revisions due to Out-of-Merit-Order Dispatch**	**Revisions Due to Unit Controls**	**Total Change**
SO_2	2012	5,163		5,163
SO_2	2014	5,163		5,163
Annual NOX	2012	547	2,218	2,765
Annual NOX	2014	547	2,218	2,765
Ozone Season NOX	2012	257	964	1,221
Ozone Season NOX	2014	257	964	1,221

The original and revised values for the state SO_2, annual NOX, and ozone season NO_X budgets, assurance levels, and new unit set-asides are described in Table C.18.g.

Table C.18.g.: Impact of Ohio Budget Revisions for Out-Of-Merit-Order Dispatch and Control Revisions

			Assurance Level		Total New Unit Set-Aside*	
	Program	Budget	% of Budget	Tons	% of Budget	Tons
2012 Before Direct Final Revisions Rule	SO_2	310,230	-	-	2%	6,205
2012 After Direct Final Revisions Rule	SO_2	315,393	-	-	2%	6,308
2014 Before Direct Final Revisions Rule	SO_2	137,077	118%	161,751	2%	2,742
2014 After Direct Final Revisions Rule	SO_2	142,240	118%	167,843	2%	2,845
2012 Before Direct Final Revisions Rule	Annual NO_X	92,703	-	-	2%	1,854
2012 After Direct Final Revisions Rule	Annual NO_X	95,468	-	-	2%	1,909
2014 Before Direct Final Revisions Rule	Annual NO_X	87,493	118%	103,242	2%	1,750
2014 After Direct Final Revisions Rule	Annual NO_X	90,258	118%	106,504	2%	1,805
2012 Before Direct Final Revisions Rule	Ozone-Season NO_X	40,063	-	-	2%	801
2012 After Direct Final Revisions Rule	Ozone-Season NO_X	41,284	-	-	2%	826
2014 Before Direct Final Revisions Rule	Ozone-Season NO_X	37,792	121%	45,728	2%	756
2014 After Direct Final Revisions Rule	Ozone-Season NO_X	39,013	121%	47,206	2%	780

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations

19) New York

EPA is finalizing, based on comments, an increase to New York's SO_2, annual NO_X, and ozone season NO_X budget in 2012 and 2014 to reflect the assumption of near-term operational constraints affecting units at the East River plant, based on information provided by the facility operator demonstrating that the plant is required to run for non-economic reasons. EPA's analysis in the final Transport Rule did not incorporate the immediate-term local conditions described in recently submitted documentation that appear likely to necessitate non-economic generation at the units displayed below during the implementation of the Transport Rule programs. EPA is assuming additional generation will be dispatched from units at the East River plant based on immediate-term operational constraints provided by Con-Ed.[73] As discussed later in this section, EPA assumes that the additional generation dispatched from East River would offset generation that would otherwise come from combined cycle units within the state, and the revision to New York's state budget is based on the net change to projected emissions taking that offsetting factor into account. The net impact of these changes on the state's SO_2, annual NOX, and ozone season NO_X budget are 84 ton, 694 ton, and 127 ton increases, respectively.

The calculations of the increase in SO_2, annual NO_X, and ozone season NO_X emissions due to out-of-merit-order dispatch at the East River plant is shown in Tables C.19.a., C.19.b., and C.19.c. For each unit with out-of-merit-order dispatch, the capacity, 2012 emissions from TR_Remedy Final_2012, heat rate, generation from TR_Remedy Final_2012, and emission rate from EPA's NEEDS database are shown (columns A to G). The average out-of-merit-order capacity factor is shown in column H. The additional generation for out-of-merit-order dispatch was calculated by multiplying the capacity, the average out-of-merit-order capacity factor, and the number of hours in the ozone season (column I). The additional heat input required was calculated by multiplying the incremental generation by the unit's heat rate (column J). Finally, the additional emissions associated with the out-of-merit-order generation were calculated by multiplying the additional heat input by the unit's NO_X emission rate.

The East River units are part of the Manhattan District Heating System such that their emissions are driven by complex interactions of local electricity and steam demand, and all of these emissions are relevant to the state's Transport Rule budgets. The emissions adjustments calculated in these tables affect the two steam units (Units 60 and 70) that did not operate in the EPA projections, but are required to run to support the district heating system and also provide electricity. The remaining two units (Units 1 and 2) did operate in the EPA projections at reasonable levels and are not included in the adjustments. In addition, since Unit 70 operates as a electricity-only unit during in ozone season so that there is no ozone-season steam requirement for non-economic operation, Unit 70 is not included in the revisions for the ozone season. In calculating the net impact on the state budgets, only the increased electricity generation would affect EPA's prior projected emissions, as such generation is assumed to offset generation at other units in the state in order to maintain the balance between modeled electricity supply and demand. Therefore, the heat input for each output is displayed separately to make clear the generation that needs to be offset, which in this particular case represents only a fraction of the revised incremental heat input.

[73] EPA-HQ-OAR-2009-0491-4761 and the document "Clarification of comments originally filed on the TR Revisions Rule by Con-Ed" found in the docket for this rulemaking.

Table C.19.a.: Calculation to Determine New York SO_2 Budget Revisions - Assuming out-of-merit-order dispatch at East River

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Annual SO_2 Emissions from TR_ Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/ kWh)**	**Annual Generation from TR_ Remedy Final_2012 (GWh)**	**Annual SO_2 Rate (lbs/ MMBtu)**	**Annual Average Out-Of-Merit-Order Capacity Factor For Electricity**	**Additional Annual Generation***	**Additional Annual Elec Heat Input (MMBtu)**	**Additional Annual Steam Heat Input (MMBtu)**	**Percent of Heat Input from Oil****	**Additional Annual Heat Input from Oil**	**Additional Annual SO_2 Emissions-Total (tons)**
Calculation								*C*H*8.760*	*E*I*			*(J+K)*L*	*G*M/2000*
East River	2493_B_60	134	0	12,830	0	0.31	36.1%	423.8	5,436,793	499,577	5.3%	316,408.5	49
East River	2493_B_70	180	0	11,980	0	0.31	15.4%	242.8	2,909,070	1,372,350	5.3%	228,199.7	35
Total								**666.6**	**8,345,862**	**1,871,927**		**544,608.2**	**84.4**

*The formula used to calculate Column I uses a multiplier of 8.760 because there are 8.760 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.

** Average percentage of oil btu input at East River units 60 and 70 from 2010 EIA 923 data.

Table C.19.b.: Calculation to Determine New York Annual NO_X Budget Revisions - Assuming out-of-merit-order dispatch at East River											
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Annual NO_X Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Annual Generation from TR_Remedy Final_2012 (GWh)**	**Annual NO_X Rate (lbs/MMBtu)**	**Annual Average Out-Of-Merit-Order Capacity Factor For Electricity**	**Additional Annual Generation***	**Additional Annual Elec Heat Input (MMBtu)**	**Additional Annual Steam Heat Input (MMBtu)**	**Additional Annual NO_X Emissions-Total (tons)**
Calculation								*C*H*8.760*	*E*I*		*G*(J+K)/2000*
East River	2493_B_60	134	0	12,830	0	0.13	36.1%	423.8	5,436,793	499,577	394.1
East River	2493_B_70	180	0	11,980	0	0.15	15.4%	242.8	2,909,070	1,372,350	328.3
Total								**666.6**	**8,345,862**		**722.4**

*The formula used to calculate Column I uses a multiplier of 8.760 because there are 8.760 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.

Table C.19.c.: Calculation to Determine New York Ozone-Season NO_X Budget Revisions - Assuming out-of-merit-order dispatch at East River											
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*
Plant Name	**Unique Id**	**Capacity (MW)**	**2012 Ozone Season NO_X Emissions from TR_Remedy Final_2012 (1000 tons)**	**Heat Rate (BTU/kWh)**	**Ozone Season Generation from TR_Remedy Final_2012 (GWh)**	**Ozone Season NO_X Rate (lbs/MMBtu)**	**Ozone Season Average Out-Of-Merit-Order Capacity Factor for Electricity**	**Additional Ozone Season Generation***	**Additional Ozone Season Elec Heat Input (MMBtu)**	**Additional Ozone Season Steam Heat Input (MMBtu)**	**Additional Ozone Season NO_X Emissions-Total (tons)**
Calculation								*C*H*3.672*	*E*I*		*G*(J+K)/2000*
East River	60	134	0	12,830	0	0.13	29.3%	144.2	1,849,702	160,106	133
*The formula used to calculate Column I uses a multiplier of 3.672 because there are 3,672 hours of possible operation in the ozone season; that factor is divided by 1,000 to yield units in GWh.											

As calculated in Table C.19.d., EPA is assuming that the increase in generation reflecting out-of-merit-order dispatch would be offset by decreasing generation at New York combined cycle units, shown in these calculations as a representative unit with a heat rate (column B) and emission rate (column C) equal to the generation-weighted average of New York combined cycle units.[74] The ozone season NO_X emissions associated with the displaced generation (column D) were calculated by multiplying that generation by the average heat rate and the relevant emission rate at the representative combined cycle unit.

[74] These generation-weighted average heat rates and emission rates are derived using calculations found in the Excel workbook titled "Calculation of heat rate and emission rate averages used in Revisions Rule Part II" found in the docket for this rulemaking.

Table C.19.d.: Calculation of Emissions from Displaced Generation at New York Combined Cycle Units				
	A	*B*	*C*	*D*
Program Period	**Displaced Generation (GWh)**	**Heat Rate (BTU/kWh)**	**Emission Rate (lbs/MMBTU)**	**Displaced NO_X Emissions (tons)**
Calculation				*A*B*C/2000*
SO_2	667	7,236	0	0
Annual NO_X	667	7,236	0.011824358	29
Ozone Season NO_X	144	7,244	0.012305053	6

The total revision to New York's state budget due to the out-of-merit-order dispatch is calculated in Table C.19.e. The emissions associated with the generation displaced by the out-of-merit-order generation (row B) were subtracted from the increase in emissions due to the out-of-merit-order generation (row A) to determine the net emission budget changes for New York (row C).

Table C.19.e.: Calculation to Determine Net New York SO_2, Annual NO_X and Ozone Season NO_X Budget Revisions (tons)							
		2012			**2014**		
		SO_2	**Annual NO_X**	**Ozone Season NO_X**	**SO_2**	**Annual NO_X**	**Ozone Season NO_X**
A	Additional Emissions Due to Out-Of-Merit-Order Generation	84	722	133	84	722	133
B	Displaced Emissions from Out-Of-Merit-Order Generation	0	29	6	0	29	6
C	**Net Budget Revisions for New York (A-B)**	**84**	**694**	**127**	**84**	**694**	**127**

The total sum of changes to New York emission budgets in these revisions are shown in Table C.19.f. below.

Table C.19.f.: Total Budget Revisions for New York (tons)				
Budget	**Year**	**Revisions due to Out-of-Merit-Order Dispatch**	**Revisions Due to Unit Controls**	**Total Change**
SO_2	2012	84	5,360	5,444
SO_2	2014	84	5,360	5,444
Annual NOX	2012	694	--	694
Annual NOX	2014	694	--	694
Ozone Season NOX	2012	127	--	127
Ozone Season NOX	2014	127	--	127

The original and revised values for the state ozone season NO_X budget, assurance level, and new unit set-aside are described in Table C.19.g.

Table C.19.g.: Impact of New York Budget Revisions for Controls and Out-Of-Merit-Order Dispatch Revisions

	Program	Budget	Assurance Level		Total New Unit Set-Aside*	
			% of Budget	Tons	% of Budget	Tons
2012 Before Direct Final Revisions Rule	SO_2	30,852	-	-	2%	617
2012 After Direct Final Revisions Rule	SO_2	36,296	-	-	2%	726
2014 Before Direct Final Revisions Rule	SO_2	22,112	118%	26,092	2%	442
2014 After Direct Final Revisions Rule	SO_2	27,556	118%	32,516	2%	551
2012 Before Direct Final Revisions Rule	Annual NO_X	21,028	-	-	2%	421
2012 After Direct Final Revisions Rule	Annual NO_X	21,722	-	-	2%	434
2014 Before Direct Final Revisions Rule	Annual NO_X	21,028	118%	24,813	2%	421
2014 After Direct Final Revisions Rule	Annual NO_X	21,722	118%	25,632	2%	434
2012 Before Direct Final Revisions Rule	Ozone-Season NO_X	10,242	-	-	2%	205
2012 After Direct Final Revisions Rule	Ozone-Season NO_X	10,369	-	-	2%	207
2014 Before Direct Final Revisions Rule	Ozone-Season NO_X	10,242	121%	12,393	2%	205
2014 After Direct Final Revisions Rule	Ozone-Season NO_X	10,369	121%	12,546	2%	207

*Approximate set-aside amounts, may be adjusted upwards or downwards slightly following rounding of existing unit allocations