Technical Support Document (TSD) for the Cross State Air Pollution Rule Addendum

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

# Technical Revisions to State Budgets and New Unit Set-Asides

U.S Environmental Protection Agency

Office of Air and Radiation

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EPA finalized the Transport Rule in July of 2011[1]. As described in the proposed "Revisions to Federal Implementation Plans to Reduce Interstate Transport of Fine Particulate Matter and Ozone" preamble, EPA is proposing to make revisions to several states' emission budgets under the Transport Rule. EPA is also proposing to revise the new unit set-asides (NUSAs) in certain states. This technical support document shows the underlying data and calculations used to quantify each proposed revision to state budgets and provides the information used to determine revised NUSAs in certain states. The first section below summarizes revisions to state budget and NUSAs. The second section provides a description of each revision and accompanying tables demonstrating the data and calculations associated with each revision. Each proposed revision to a state budget also entails corresponding revisions to the absolute number of allowances put into the relevant new unit set-aside[2] as well as to the absolute assurance level[3] 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.**

EPA is proposing revisions to state emission budgets and/or NUSAs for Arkansas, Florida, Louisiana, Michigan, Mississippi, Nebraska, New Jersey, New York, Texas, and Wisconsin. 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. These changes are minor relative to the scope of each Transport Rule program. The proposed revisions to the Transport Rule state budgets and NUSAs are summarized in the table below.

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[1] Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals (76 FR 48208).

[2] The "Total NUSAs" presented for each state in section B of this document include allowances under both the State NUSA and the Indian Country NUSA (where the latter exists in the given state).

[3] 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.

| Proposed 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 $NO_X$ |
| Florida | | | 819 | | | | | | 2% |
| New York | 3,527 | 3,485 | 1,911 | 3,527 | 3,485 | 1,911 | 2% | 2% | 2% |
| New Jersey | 2,096 | 420 | 592 | 0 | 112 | 195 | 2% | 2% | 2% |
| Louisiana | | | 4,231 | | | 4,231 | | | 3% |
| Mississippi | | | 2,136 | | | 2,136 | | | 2% |
| Texas | 70,067 | 1,375 | 1,375 | 70,067 | 1,375 | 1,375 | 5% | 4% | 4% |
| Wisconsin | | 2,473 | | 7,757 | 2,473 | | 4% | 6% | |
| Nebraska | | 3,599 | | | 3,599 | | | 6% | |
| Michigan | | 5,228 | | | 5,228 | | | 2% | |
| Arkansas | | | | | | | | | 5% |
| Total Revisions to Each Transport Rule Program | 75,690 | 16,580 | 11,064 | 81,351 | 16,272 | 9,848 | N/A | N/A | N/A |

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

**Section B: Technical Revisions to States' TR Emission Budgets and NUSAs.**

**1) <u>Michigan</u>**

EPA is proposing to increase Michigan's 2012 and 2014 annual $NO_X$ budgets 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 proposing to revise the state's 2012 and 2014 annual $NO_X$ emission budgets[4] 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 would

[4] 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 proposed revision of a 2012 state budget would apply to the state budget for 2012 and 2013, and any proposed revision of a 2014 state budget would apply to the state budget for 2014 and thereafter.

affect the calculation of the state's ozone-season $NO_X$ budget, and EPA will address that budget when finalizing the Transport Rule Supplemental Notice of Proposed Rulemaking (SNPR).

| **Table 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/B* | | *D x B* | *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).[5] 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 proposed increase to the state's annual $NO_X$ budget (column F).

This budget change would 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 Michigan would remain at 2%. The original and revised values for the state annual NOX budget, assurance level, and new unit set-aside are described in the table below.

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

| Table 1.208b.: 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 | 118% | 77,197 | 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 proposing to increase 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 NOx budgets. Therefore, EPA is proposing to revise 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 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/B* | | *D x B* | *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).[6] 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 proposed increase to the state's annual $NO_X$ budget (column F).

The proposed change to the annual $NO_X$ emission budget in Nebraska would 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 proposed 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.

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

| Table 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 | 118% | 35,446 | 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

### 3) <u>Texas (Removed FGDs)</u>

EPA is proposing to 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. [7] [8] 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 proposing to revise 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.

[7] "Corporate Sustainability Report", CPS Energy, 2010. P.57. Retrieved from http://www.cpsenergy.com/files/Sustainability_Report.pdf
[8] 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

| Table 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/B* | | *D x B* | *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.[9] 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 revised emission projection (no FGD assumed, column E) and the remedy emission projection (FGD assumed, column A) determines the amount of the proposed increase to the state's $SO_2$ budget (column F).

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

**4) Texas (FGD Capture)**

EPA is also proposing to increase Texas's 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

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

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 EIA 860 form. 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. Therefore, EPA is proposing to revise the state's $SO_2$ emission budget to reflect the removal rates achieved by these FGDs in 2008 as reported on the EIA 923 form. This recalculation to projected emissions at these units results in a 43,708 ton increase to the state's $SO_2$ budget. The calculations to quantify this revision are shown in the table below.

**Table 4: Calculation to Determine Texas $SO_2$ Budget Revision – Assuming Revised $SO_2$ removal Rates at FGD**

| | | *A* | *B* | *C* | *D* | *E* | *F* |
|---|---|---|---|---|---|---|---|
| **Plant Name** | **Unit ID** | **Total $SO_2$ Emission from TR_Remedy_Final_2012 (1000 Tons)** | **EIA 860 $SO_2$ Removal Rate (used in budget determination)** | **2008 EIA 923 $SO_2$ Removal Rate (used for budget revision)** | **Uncontrolled Emissions (assuming no FGD) (1000 tons)** | **Revised Emissions (assuming FGD with revised removal rate) (1000 tons)** | **Net Budget Revision (1000 tons)** |
| *Calculation* | | | | | *A/(1-B)* | *D*(1-C)* | *E-A* |
| Martin Lake | 1 | 1.86284104 | 0.95 | 0.657 | 37.25682081 | 12.77908954 | 10.9162485 |
| Martin Lake | 2 | 1.854018172 | 0.95 | 0.795 | 37.08036345 | 7.601474507 | 5.747456334 |
| Martin Lake | 3 | 1.745038028 | 0.95 | 0.748 | 34.90076056 | 8.794991661 | 7.049953633 |
| Monticello | 3 | 2.548471002 | 0.95 | 0.659 | 50.96942003 | 17.38057223 | 14.83210123 |
| Oklaunion | 1 | 2.232109754 | 0.868 | 0.726 | 16.90992238 | 4.633318731 | 2.401208977 |
| Sandow | 4 | 1.252293549 | 0.92 | 0.766 | 15.65366936 | 3.662958629 | 2.410665081 |
| W A Parish | WAP8 | 1.594838503 | 0.85 | 0.817 | 10.63225669 | 1.945702974 | 0.350864471 |
| **Total** | | **13.090** | | | | **56.798** | **43.708** |

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 revised emission rate based on EIA 923 data. Column D 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 C to these uncontrolled emissions, which yields the revised emission projection for each unit in column E. The difference between this revised emission projection (lower FGD capture assumed, column E) and the remedy emission projection (higher FGD capture assumed, column A) determines the amount of the proposed increase to the state's $SO_2$ budget (column F).

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

## 5) Florida

EPA is proposing 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 proposing to increase 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 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 NOx 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.[10] 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 proposed increase to the state's 2012 ozone-season $NO_X$ budget.

[10] 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 Budget Revisions" found in the docket for this rulemaking.

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. EPA's proposed revision does not affect Florida's 2014 ozone-season $NO_X$ budget as originally finalized, as Crystal River Unit 3 is expected to re-enter service by that time.

**Table 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 | 121% | 34,659 | 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%.[11] EPA is now proposing to revise 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.

[11] 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).

| | Table 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% |

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 would change by the levels shown below.[12]

| Table 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) <u>Texas (NUSA)</u>**

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 now proposing to revise 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.

[12] The proposed 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 proposed revision, please see the document entitled "FIP Unit Level Allocations with Proposed Revisions to CSAPR" found in the docket to this rulemaking.

| Table 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) | 331,734 | 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 proposed revisions to Texas state budgets (and these revisions to the NUSAs) on the state's NUSAs and assurance levels are shown in Tables 13.e.

**8) <u>Wisconsin</u>**

EPA is proposing 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 proposing to revise 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 proposing 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 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 proposed increase to Wisconsin's 2014 $SO_2$ budget related to this unit, shown in column C.

EPA is also proposing 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 proposing 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 proposing any revision related to these units for the state's 2012 $SO_2$ budget.

| **Table 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 proposed increase to the state's 2014 $SO_2$ budget (column D).

EPA is also proposing 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 proposing to revise 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.

| Table 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/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.[13] 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 proposed increase to the state's 2012 and 2014 annual $NO_X$ budgets (column F).

The proposed revisions to the $SO_2$ emission budget for Wisconsin would result 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 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.[14] 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 proposed budget revision would decrease 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 would reduce 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

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

[14] While this relationship is also true for annual $NO_X$, the proposed 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.

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 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)**

| | Program | Budget | Assurance Level | | Total New Unit Set-Aside* | |
|---|---|---|---|---|---|---|
| | | | % of Budget | Tons | % of Budget | Tons |
| 2012 Initial | $SO_2$ | 79,480 | 118% | 93,786 | 5% | 3,974 |
| 2012 Revised | $SO_2$ | 79,480 | 118% | 93,786 | 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 | 118% | 40,239 | 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

## 9) New York

EPA is proposing to increase 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 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. [15] To meet the requirements of these rules, the New York ISO (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 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.[16]

*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

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[15] 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.
[16] See *Analysis of New York City Averaging Plans for Compliance with NOx Emissions Limitations*, New York Independent System Operator, Inc., 2011

generators must be prepared to burn oil in each season.[17] 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.[18] There is a separate and similar minimum oil burn rule affecting units in Long Island.[19]

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.[20]

*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[21] 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 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*

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[17] *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.
[18] 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.
[19] See the document, *Long Island Gas Burn Procedures – 2011*, in the docket for the TR Rule Revisions Proposal, Docket.
[20] The EIA data used for this calculation is available at: http://www.eia.gov/cneaf/electricity/page/eia906_920.html.
[21] See NYISO Operating Study Summer 2011 and Appendices, New York Independent System Operator, July 14, 2011, page C-3.

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 proposed 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 9.a and 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 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 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 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 SO2 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 9.c and 9.d below.

| Table 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 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 SO2 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 9.e.

| **Table 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 proposed 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 9.e. These calculations are shown in Table 9.f.

| | **Table 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 proposed revisions to the annual and ozone season $NO_X$ emission budgets for New York would 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.[22] 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 proposed budget revisions would 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 values, the absolute number of allowances in the New York NUSAs would rise in accordance with the proposed 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 9.g below.

[22] While this relationship is also true for $SO_2$, the proposed 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 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 | 118% | 36,405 | 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 | 118% | 24,813 | 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 | 121% | 10,081 | 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 proposing to increase 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[23]. Therefore, EPA is adjusting the state's 2012 emission budgets to reflect this 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 $SO_2$ budget; a 308 ton increase to the state's annual $NO_X$ budget; and a 397 ton increase to the state's ozone season $NO_X$ budget. As discussed later in this section, EPA assumes that the generation previously

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

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 proposed 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 10.a.

| Table 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* | | | *2*A/B* | | *D x B / 2* | *E - A* |
| $SO_2$ | 0.175 | 2.282 | 0.150 | 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[24] 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).[25] 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).

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

[24] The $SO_2$emission 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 SO2 removal rate of 93% yields an uncontrolled $SO_2$ emission rate of 2.19 lbs/mmBtu.
[25] See National Electric Energy Data System (NEEDS) v4.10 available at http://www.epa.gov/airmarkets/progsregs/epa-ipm/BaseCasev410.html

BL England Unit 1 would be offset by increasing generation at New Jersey combined cycle units,[26] represented in these calculations as a generic unit with a heat rate and emission rates equal to the capacity-weighted average of New Jersey combined cycle units.[27] The calculations of emissions from this replaced generation are shown in Table 10.b.

| Table 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 | 8550 | 0 | 0 |
| $NO_X$ | 253.3 | 8550 | 0.044 | 0.048 |

EPA calculated the $SO_2$ and $NO_X$ emissions in table 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 10.c below.

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

[27] 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 Budget Revisions" found in the docket for this rulemaking.

| | | | |
|---|---|---|---|
| **Table 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 | | 0.048 |
| *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*** | **0.308** |
| ***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 proposing to increase 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[28]. 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 proposed 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 112 ton increase in annual $NO_X$ and a 195 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 10.d and 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 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_ | 114 | 0.010 | 8841 | 55.18 | 0.04 | 20.1% | 84.16 | 744,050 | 15.6 |

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

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | G_1301 | | | | | | | | | |
| 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 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** | **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 Edison | 2400_ G_13 | 42 | 0.003 | 16893 | 1.37 | 0.27 | 0.8% | 2.85 | 48,155 | 6.5 |
| 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 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 capacity-weighted average of New Jersey combined cycle units.[29] 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 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 | 8,850 | 0.044 | 775 |
| Ozone Season | 1,142 | 8,850 | 0.044 | 215 |

The total revisions proposed 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 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 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).

[29] 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 Budget Revisions" found in the docket for this rulemaking.

| Table 10.g: Calculation to Determine Net New Jersey SO2, Annual NOX, and Ozone Season $NO_X$ Budget Revisions (tons) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **2012** | | | **2014** | | |
| | | **SO2** | **Annual $NO_X$** | **Ozone Season $NO_X$** | **SO2** | **Annual $NO_X$** | **Ozone Season $NO_X$** |
| *A* | Net Emissions Increases Due to Changes at BL England Unit 1 | 2,096 | 308 | 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 | 775 | 215 | 0 | 775 | 215 |
| ***D*** | **Net Budget Revisions for New Jersey (A+B-C)** | **2096** | **420** | **592** | **0** | **112** | **195** |

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 10.h.

| Table 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 | 118% | 9,051 | 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 $NO_X$ | 7,686 | 118% | 9,069 | 2% | 154 |
| 2014 Initial | Annual $NO_X$ | 7,266 | 118% | 8,574 | 2% | 145 |
| 2014 Revised | Annual $NO_X$ | 7,378 | 118% | 8,706 | 2% | 148 |
| 2012 Initial | Ozone-Season $NO_X$ | 3,382 | 121% | 4,092 | 2% | 68 |
| 2012 Revised | Ozone-Season $NO_X$ | 3,974 | 121% | 4,809 | 2% | 79 |
| 2014 Initial | Ozone-Season $NO_X$ | 3,382 | 121% | 4,092 | 2% | 68 |
| 2014 Revised | Ozone-Season $NO_X$ | 3,577 | 121% | 4,328 | 2% | 72 |

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

## 11) Louisiana

EPA is proposing to increase 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.[30] 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 proposed 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 4,231 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 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.

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

| Table 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 |
| 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 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 as a representative unit with a heat rate (column B) and emission rate (column C) equal to the capacity-weighted average of Louisiana combined cycle units.[31] 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 11.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 | 4,212 | 6,798 | 0.05 | 716 |

The total revision proposed to Louisiana's state budget due to the out-of-merit-order dispatch is calculated in Table 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).

[31] 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 Budget Revisions" found in the docket for this rulemaking.

| Table 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 | 716 |
| ***C*** | **Net Emission budget Change For Louisiana (A-B)** | **4,231** |

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

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

| | | Assurance Level | | Total New Unit Set-Aside* | |
|---|---|---|---|---|---|
| | Budget | % of Budget | Tons | % of Budget | Tons |
| 2012 Initial | 13,432 | 121% | 16,253 | 3% | 403 |
| 2012 Revised | 17,663 | 121% | 21,372 | 3% | 530 |
| 2014 Initial | 13,432 | 121% | 16,253 | 3% | 403 |
| 2014 Revised | 17,663 | 121% | 21,372 | 3% | 530 |

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

**12) <u>Mississippi</u>**

EPA is proposing to increase 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.[32] 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 proposed 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 2,136 ton increase.

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 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.

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

| Table 12.a: Calculation to Determine Mississippi Ozone Season NOX 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*** | **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 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 capacity-weighted average of Mississippi combined cycle units.[33] 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.

[33] 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 Budget Revisions" found in the docket for this rulemaking.

| Table 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 | 7,388 | 0.03 | 163 |

The total revision proposed to Mississippi's state budget due to the out-of-merit-order dispatch is calculated in Table 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 12.c: Calculation to Determine Net Mississippi Ozone Season $NO_X$ Budget Revisions | | |
|---|---|---|
| A | Additional Emissions Due to Out-Of-Order-Merit Dispatch | 2,299 |
| B | Displaced Emissions From Out-Of-Order-Merit Dispatch | 163 |
| **C** | **Net Change in Emission budget For Mississippi (A-B)** | **2,136** |

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

**Table 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 | 12,296 | 121% | 14,878 | 2% | 246 |
| 2014 Initial | 10,160 | 121% | 12,294 | 2% | 203 |
| 2014 Revised | 12,296 | 121% | 14,878 | 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 proposing to 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.[34] 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 proposed 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.

[34] 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 annual and ozone season $NO_X$ emissions due to out-of-merit-order dispatch at the two facilities is shown in Table 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 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 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**** | **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 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 capacity-weighted average of Texas combined cycle units.[35] 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 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* |
| Annual | 3,059 | 7,376 | 0.019 | 214 |
| Ozone Season | 3,059 | 7,376 | 0.019 | 214 |

The total revisions proposed to the Texas state budgets due to out-of-merit-order dispatch are calculated in Table 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 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. | | |

[35] 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 Budget Revisions" found in the docket for this rulemaking.

In addition to the revisions summarized in Table 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 13.d. The cumulative impacts of all of the technical revisions to the Texas budgets and NUSAs are summarized in Table 13.e.

| Table 13.d.: Summary of Texas $SO_2$ Budget Revisions | |
|---|---|
| Removed FGD Revision | 26,359 |
| FGD Capture Revision | 43,708 |
| **Total $SO_2$ Budget Revision** | **70,067** |

**Table 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)**

| | Program | Budget | Assurance Level | | Total New Unit Set-Aside* | |
|---|---|---|---|---|---|---|
| | | | % of Budget | Tons | % of Budget | Tons |
| 2012 Initial | $SO_2$ | 243,954 | 118% | 287,866 | 5% | 12,198 |
| 2012 Revised | $SO_2$ | 314,021 | 118% | 370,545 | 5% | 15,701 |
| 2014 Initial | $SO_2$ | 243,954 | 118% | 287,866 | 5% | 12,198 |
| 2014 Revised | $SO_2$ | 314,021 | 118% | 370,545 | 5% | 15,701 |
| 2012 Initial | Annual $NO_X$ | 133,595 | 118% | 157,642 | 3% | 4,008 |
| 2012 Revised | Annual $NO_X$ | 134,970 | 118% | 159,265 | 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 | 121% | 77,946 | 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