# Appendix C:
# Contingency Measure Calculations

Chapter 6 outlines the State's contingency plans, needed in the event that either New Jersey associated nonattainment area is unable to attain the 1997 annual $PM_{2.5}$ health standard by its required attainment date. These plans require the implementation of the following measures (nine State measures and one Federal):

1) Diesel idling rule changes,
2) Municipal Waste Combustor (Incinerator) $NO_x$ Rule,
3) Onroad Motor Vehicle Control Programs (State and Federal) (Fleet turnover 2010),
4) Nonroad Motor Vehicle Control Programs (Fleet turnover 2010),
5) Industrial/Commercial/Institutional (ICI) Boiler Rule 2009 (portion not modeled),
6) $NO_x$ RACT Rule 2006 (portion not modeled),
7) Asphalt production plants rule, and
8) Controls from EGU Consent Decree (PSE&G Hudson $SO_2$), and
9) Refinery Consent Decrees (Sunoco and Valero)

A detailed description of all these measures is included in Chapter 4 (a brief description is also provided in this appendix as well) and the estimated benefits from these measures are included in Chapter 6. The remainder of this appendix provides the detailed calculations used to determine the emission benefits from these measures. Since some of the measures are already implemented and it is the State and Federal government's intention to implement the remainder of these measures as soon as practical, regardless of their need in the contingency plans, these additional benefits provide further confidence that New Jersey will attain the $PM_{2.5}$ National Ambient Air Quality Standard (NAAQS) by 2009. By following the USEPA's guidance that encourages early implementation of contingency measures and relying on measures already implemented or under development, New Jersey is ensuring that no additional contingency measures will need to be developed and implemented beyond those identified.[1]

## 1. New Jersey Diesel Idling Rule Changes Calculations

Emission reductions will be realized through implementation of rule changes to Subchapter 14, Control and Prohibition of Air Pollution from Diesel-Powered Motor Vehicles, adopted in May 2007. These changes included clarifying the language on some exemptions; eliminating other exemptions, such as "sun setting" the sleeper berth exemption in 2010; and other associated changes such as enforcement, education, outreach, and legislative changes.

Emission Reduction Calculation Methodology:
The following emission reduction estimates are calculated for use as credits for contingency measure purposes only. They are based on the amount of idling emissions implicit in the

[1] 72 Fed. Reg. 20642-43 (April 25, 2007).

MOBILE6 model. This methodology differs from that used for estimating emission benefits during the rulemaking process.

Emission benefits were estimated by:

1. Starting with the MOBILE6 based value[2] for the percent of heavy duty truck emissions that result from idling: Idling emissions from onroad (class 8) heavy duty highway trucks represent approximately 3.4 percent of total emissions;
2. Applying an idling reduction percent assumption: Assuming that New Jersey's actions will reduce idling by 50 percent; and
3. Applying this to the New Jersey 2009 inventory emissions for class 8 heavy duty highway trucks.

The 50 percent reduction in idling from class 8 vehicles is estimated to be achieved from the following sources:

- Subchapter 14 rule revision (which includes eliminating / tightening many exemptions, the phasing-in of idling alternates such as auxiliary power units and sun setting the sleeper berth exemption in 2010);
- Increased enforcement through a legislative language change (N.J.S.A. 39:3-70.2), which allows State and local police to clearly enforce this rule;
- Education and outreach;
- Idling sweeps by the Compliance and Enforcement group; and
- Sales of "No Idling" signs, yielding increased awareness of the regulation.

The 2009 Emission Inventory for class 8 onroad diesel heavy duty vehicles attributable to long duration truck idling is 8 tpy of $PM_{2.5}$ and 435 tons per year (tpy) of $NO_x$ for the New Jersey portion of the Northern New Jersey/New York/Connecticut nonattainment area and 4 tpy of $PM_{2.5}$ and 223 tpy of $NO_x$ for the New Jersey portion of the Southern New Jersey/Philadelphia nonattainment area. A 50 percent reduction yields approximately 4 tpy of $PM_{2.5}$ and 218 tpy of $NO_x$ for the New Jersey portion of the Northern New Jersey/New York/Connecticut nonattainment area and 2 tpy of $PM_{2.5}$ and 112 tpy of $NO_x$ for the New Jersey portion of the Southern New Jersey/Philadelphia nonattainment area.

2. Municipal Waste Combustors (Incinerators) $NO_x$ Rule

The NJDEP proposed a $NO_x$ standard of 150 ppm for municipal solid waste combustors (MSW), based upon the capability of existing selective non-catalytic reduction (SNCR) emission controls to reduce emissions more than are now being achieved. New Jersey has four resource recovery facilities located in the following counties: Essex, Union, (both in the Northern New Jersey/New York/Connecticut nonattainment area), Camden, and Gloucester (both in the Southern New Jersey/Philadelphia nonattainment area). There are 11 municipal waste combustors (MWC) at these four facilities. There is one facility in Warren County that would be subjected to this rule but Warren County is not part of the 1997 $PM_{2.5}$

[2] USEPA. Guidance for Quantifying and Using Long Duration Truck Idling Emission Reductions in State Implementation Plans and Transportation Conformity. United States Environmental Protection Agency, Office of Transportation and Air Quality, EPA420-B-04-001, January 2004.

nonattainment area so those benefits are not included for the contingency measure in this proposed SIP revision. The NJDEP anticipates a $NO_x$ emission reduction of 240 tons per year in the Southern New Jersey/Philadelphia nonattainment area.

**Table C1: Estimated Reductions from Municipal Waste Combustors (Incinerators) Calculated for the 1997 $PM_{2.5}$ Nonattainment Areas**

| Municipal Solid Waste Plant | Air Flow Rates in Actual Cubic Feet per Minute (ACFM) | Air Flow Rates in Dry Standard Cubic Feet per Minute (DSCFM) | Pounds per hour using 100 ppm $NO_x$ limit | Pounds per hour using 130 ppm $NO_x$ limit | Pounds per hour using 150 ppm $NO_x$ limit | 1997 $PM_{2.5}$ NNJ/NY/CT NAA | 1997 $PM_{2.5}$ SNJ/PA NAA |
|---|---|---|---|---|---|---|---|
| Essex | 237,900 | 60867 | 44 | 57 | 65 | x | |
| Essex | 220,000 | 56287 | 40 | 52 | 60 | x | |
| Essex | 229,000 | 58590 | 42 | 55 | 63 | x | |
| **Average ACFM** | **228,967** | 58581 | | | | | |
| Camden | 97,409 | 24922 | 18 | 23 | 27 | | x |
| Camden | 99,064 | 25346 | 18 | 24 | 27 | | x |
| Camden | 101,495 | 25967 | 19 | 24 | 28 | | x |
| **Average ACFM** | **99,323** | 25412 | | | | | |
| Union | 128,029 | 32756 | 23 | 30 | 35 | x | |
| Union | 131,191 | 33565 | 24 | 31 | 36 | x | |
| Union | 130,767 | 33457 | 24 | 31 | 36 | x | |
| **Average ACFM** | **129,996** | 33259 | | | | | |
| | | | | | | | |
| Warren | 50,005 | 12794 | 9 | 12 | 14 | | |
| Warren | 55,702 | 14251 | 10 | 13 | 15 | | |
| **Average ACFM** | **52,854** | 13523 | | | | | |
| | | | | | | | |
| Gloucester | 62,820 | 16072 | 12 | 15 | 17 | | x |
| Gloucester | 72,130 | 18454 | 13 | 17 | 20 | | x |
| **Average ACFM** | **67,475** | 17263 | | | | | |
| | | | | | | | |
| **Total pounds per hour =** | | | 296 | 385 | 444 | | |
| NNJ/NY/CT NAA | | | 197 | 256 | 296 | | |
| SNJ/PA NAA | | | 79 | 103 | 119 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Warren | | | 19 | 25 | 29 | | |
| | | | | | | | |
| Total tons per year = | | | 1296 | 1685 | 1944 | | |
| NNJ/NY/CT NAA | | | 864 | 1123 | 1296 | | |
| SNJ/PA NAA | | | 347 | 452 | 521 | | |
| Warren | | | 85 | 110 | 127 | | |
| | | | | | | | |
| Assumption: 15% oxygen in the stack and 300 degrees F stack temperature | | | | | | | |
| Actual 2002 $NO_x$ in tons per year = | 1,803 | Expected reductions = | 507 | 118 | -141 | | |
| NNJ/NY/CT NAA | 787 | | None | None | None | | |
| SNJ/PA NAA | 761 | | 414 | 309 | 240 | | |
| Warren | 255 | | 170 | 145 | 128 | | |
| | | | | | | | |
| Permitted $NO_x$ = | 3,541 | | | | | | |

Emission Reduction Calculation Methodology:

The NJDEP calculated the estimated emission reductions for this measure, assuming a 150 ppm $NO_x$ limit, by:

- Estimating emissions from each municipal solid waste plant in pounds per hour.
- Converting the pounds per hour estimate to tons per year estimate:
  (lbs/hr)(8760 hours/year)/2000 lbs/ton = tons/year
  (444 lbs/hr)(8760 hours/year)/2000 lbs/ton = 1944 tons/year
- Calculating estimated emission reductions:
  Expected reductions in emissions from MSW plants in tons/year =
  (Actual 2002 $NO_x$ emissions from MSW plants in tons/year) – (Estimated emissions from the MSW plants in tons/year)
  = (1803 tons/year) – (1944 tons/year)
  = -141 tons/year statewide

- Reductions by nonattainment area:

  NNJ/NY/CT NAA – Emissions for Essex and Union counties are showing an increase because these numbers are based on permitted air flow rates and do not reflect actual emissions. As shown in Table C1, actual emissions in 2002 (1,803 tpy) are lower than the calculated ones (1,944 tpy).

  SNJ/PA NAA:
  Actual $NO_x$ Emissions (2002) – Calculated $NO_x$ Emissions using the 150 ppm limit

761 tpy – 521 tpy = 240 tpy

The NJDEP estimated these benefits based upon permitted airflow rates at each facility. These emissions are higher than the actual emissions reported by the facility because, in general, the facilities operate at air flow rates below the permitted level. For this reason, there are no additional reduction benefits in the 1997 $PM_{2.5}$ New Jersey portion of the Northern New Jersey/New York/Connecticut nonattainment area.

When New Jersey set an emission limit in the proposed rules at 150 ppm, actual emissions were estimated to be maintained around 130 ppm. Also, the NJDEP anticipates that the facilities will decrease their emissions due to optimizing their existing $NO_x$ control systems (i.e., either injecting more ammonia or adding more nozzles). Finally, the NJDEP expects that the Camden County Resource Recovery facility will need to install a new $NO_x$ control to comply with the proposed rules. Therefore, the NJDEP expects that the estimated benefits will be even greater than those calculated.

3. Onroad Motor Vehicle Control Programs (State and Federal) (Fleet turnover 2010)

The turnover of the onroad fleet of cars, trucks, and buses (i.e., the rate a which newer vehicles replace older ones in the overall fleet population) will result in additional direct $PM_{2.5}$ and $NO_x$ emission benefits in 2009 and beyond because the new vehicles have significantly lower emission standards than the vehicles they are replacing, due to existing Federal regulations. Onroad fleet turnover will result in a $PM_{2.5}$ decrease of 76 tpy (51 tpy in the New Jersey portion of the Northern New Jersey/New York/Connecticut nonattainment area and 25 tpy in the New Jersey portion of the Southern New Jersey/Philadelphia nonattainment area); it will result in a $NO_x$ decrease of 7,421 tpy (5,613 tpy in the New Jersey portion of the Northern New Jersey/New York/Connecticut nonattainment area and 1,808 tpy in the New Jersey portion of the Southern New Jersey/Philadelphia nonattainment area).

The New Jersey Low Emission Vehicle (NJLEV) program (which is more stringent than the Tier 2 Federal standards), also contributes to the fleet turnover emission benefits. The new vehicle emission standards are also lower because of a number of Federal rules such as the 2007 Heavy Duty Diesel standards for large diesel highway trucks. In order to estimate the emission benefits for fleet turnover between mid-2009 and mid-2010, the NJDEP made a number of assumptions, because the activity data (vehicle miles traveled (VMT), speeds, etc.) obtained from the Metropolitan Planning Organizations' (MPOs') travel demand models were not yet available for 2010. The 2010 emissions were estimated by performing MOBILE6 runs for 2010 using 2009 activity levels. The results from these runs were adjusted for VMT growth by assuming that the VMT growth rate between 2009 and 2010 was similar to the average annual VMT growth rate between 2002 and 2009. The emission benefits for fleet turnover were calculated as the difference between the 2009 emissions and the 2010 emissions based on the estimated 2010 VMT. Calculation details and the MOBILE6 runs are provided in Attachment 1.

4. Nonroad Motor Vehicle Control Programs (Fleet turnover 2010)

The turnover of many of the nonroad equipment types included in the USEPA Nonroad Emission Equipment Model (NNEM), version 2005c, will also result in additional direct $PM_{2.5}$, $NO_x$, and $SO_2$ emission benefits in 2009 and beyond because the newer nonroad equipment has to meet significantly lower emission standards than the equipment that they are replacing and the new nonroad diesel fuel standard begins in 2010. Nonroad fleet turnover will result in a $PM_{2.5}$ decrease of 41 tpy (34 tpy in the New Jersey portion of the Northern New Jersey/New York/Connecticut nonattainment area and 7 tpy in the New Jersey portion of the Southern New Jersey/Philadelphia nonattainment area), a $NO_x$ decrease of 1231 tpy (1065 tpy in the New Jersey portion of the Northern New Jersey/New York/Connecticut nonattainment area and 166 tpy in the New Jersey portion of the Southern New Jersey/Philadelphia nonattainment area), and a $SO_2$ decrease of 217 tpy (185 tpy in the New Jersey portion of the Northern New Jersey/New York/Connecticut nonattainment area and 32 tpy in the New Jersey portion of the Southern New Jersey/Philadelphia nonattainment area).

The new nonroad equipment emission standards are lower primarily because of a number of Federal rules such as the 2004 Nonroad Diesel Rule and the benefits of the small gasoline engine standards through Phase 2. In order to estimate the emission benefits for nonroad equipment turnover it was necessary to run the NNEM model for 2009 and 2010. The emission benefits for nonroad equipment turnover was then calculated as the difference between the 2009 and the 2010 emissions generated by these two model runs. Calculation details and the NNEM runs are provided in Attachment 2.

5. ICI Boiler Rule 2009 (portion not modeled)

The beyond on the way (BOTW) ICI boiler rule, discussed in detail in Chapter 4, was included in the 2009 BOTW modeling. However, New Jersey has determined that the implementation of this rule will result in additional emission reductions beyond the 0.1 tpd that was included for the modeling.

Currently, New Jersey ICI boilers are regulated according to size, fuel and boiler type. New Jersey's existing $NO_x$ rules generally apply only to ICI boilers at least 50 MMBtu/hr located at major sources. New Jersey intends to propose amendments to its current ICI boiler rules at N.J.A.C. 7:27-19.7. New Jersey plans on reducing the $NO_x$ emission limits for ICI boilers between 25-100 MMBtu/hr. Under the anticipated rule proposal, there are approximately 388 ICI boilers that are assumed to achieve a 50% reduction in $NO_x$ emissions due to the lowering of the emission rate. By 2009, $NO_x$ emission reduction benefits will total approximately 6.8 tons per day. New Jersey estimates additional $NO_x$ reductions beyond those included in the 2009 BOTW modeling – 681 tpy in the Northern New Jersey/New York/Connecticut nonattainment area and 193 tpy in the Southern New Jersey/Philadelphia nonattainment area. The emission benefits were allocated to each nonattainment area based on the percent of point source emissions in each nonattainment area.

6. $NO_x$ RACT Rule 2006 (portion not modeled)

The 2006 RACT $NO_x$ rule, discussed in detail in Chapter 4, was included in the 2009 BOTW modeling. However, New Jersey has determined that the implementation of this rule will result in additional emission reductions beyond the 0.1 tpd that was included for the modeling.

The estimated emission reductions from the New Jersey 2006 amendments to Subchapter 19 "Additional $NO_x$ controls" that were included in the attainment demonstration modeling were calculated in 2001 by E.H. Pechan.[3] However, as discussed in the New Jersey rule proposal dated September 20, 2004, additional reductions were estimated from annual tune-ups for boilers. Specifically, while the benefits of the $NO_x$ RACT rule (2006) included in the regional attainment modeling were 7 tons per summer day (tpsd) (point and area sources);[4] the benefits included in the New Jersey 2006 rule proposal were 13.3 tpsd.[5] The additional emission reductions, for point sources, are approximately 4.7 tpsd statewide. Based upon location, 66 percent of the emissions are in the northern part of the State and 34 percent of the emissions are in the southern part of the State. For details on how the State calculated its benefits from the implementation of this rule, see New Jersey Register 36 N.J.R. 4228(a); September 20, 2004.

For the purposes of contingency for this proposed $PM_{2.5}$ SIP revision, the additional statewide emission reductions were estimated to tons per year (tpy) and reduced to the 1997 $PM_{2.5}$ nonattainment areas as follows:

1. Emission Benefits Statewide (all counties) = 4.7 tpsd

2. New Jersey Portion of the Northern New Jersey/New York/Connecticut nonattainment area:

    a. 0.66 * 4.7 tpsd = 3.1 tpsd
    b. 3.1 tpsd * 0.48 = 1.5 tpsd * 365 days/year = 547.5 tpy
    (48% of New Jersey's counties are in the 1997 $PM_{2.5}$ Northern New Jersey/New York/Connecticut nonattainment area)

3. New Jersey Portion of the Southern New Jersey/Philadelphia nonattainment area:

    a. 0.34 * 4.7 tpsd = 1.6 tpsd (also 4.7 tpsd – 3.1 tpsd = 1.6 tpsd)
    b. 1.6 tpsd * 0.14 = 0.22 tpsd * 365 days/year = 81.76 tpy
    (14% of New Jersey's counties are in the 1997 $PM_{2.5}$ Southern New

[3] E.H. Pechan. Control Measure Development Support Analysis of Ozone Transport Commission Model Rules. Prepared for the Ozone Transport Commission by E.H. Pechan & Associates, Springfield, VA, 01.02.001/9408.000, March 31, 2001.
[4] NJDEP. State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the Ozone National Ambient Air Quality Standard: 8-Hour Ozone Attainment Demonstration, Final. New Jersey Department of Environmental Protection, October 29, 2007.
[5] New Jersey Register 36 N.J.R. 4228(a); September 20, 2004.

Jersey/Philadelphia nonattainment area)

7. Asphalt Production Plants Rule

The NJDEP intends to propose amendments to its rules at N.J.A.C. 7:27-19.9 in order to lower $NO_x$ emissions from asphalt production facilities. The proposed amendments, based on an OTC model rule, would pursue control measures to achieve at least a 35% reduction of $NO_x$ emissions from asphalt production plants from current levels, with the inclusion of emission limits based on type of fuel combusted and implementation of Best Management Practices (BMP) requirements.

$NO_x$ Emission Reduction Calculations Methodology:

Basis:

1. NJDEP had complied asphalt pavement production plant stack emission test data between 2001 and 2006 for 29 burners from 22 facilities. A total of 119 test results were reviewed from 38 test events. There are 51 asphalt pavement production plants in New Jersey consisting of 70 asphalt dryers.
2. Industry total, plant average, and monthly production information were obtained from the asphalt pavement production industry.

Limits

Anticipated proposed limits are the average of actual stack test data less 35%. Basic statistics were reviewed in the calculation. The new limits are based on fuel type and will replace the current limit of 200 parts per million, volumetric dry (ppmvd) at 7% oxygen for all plants. Table C2 presents the anticipated proposed new limits. These limits are 37.5%, 50%, and 62.5% lower than the current limit for natural gas, #2 and #4 fuel oil, and heavier fuel oil/on-specification used oil, respectively.

**Table C2: A Comparison of New Jersey Proposed Limits to OTC Recommended Limits**

| NJ Proposed limits | OTC Recommended Limits |
|---|---|
| Natural Gas – 75ppmvd @7% Oxygen | Natural Gas (Batch and Drum) – 0.020 lb/Ton |
| Fuel Oil (#2) – 100ppmvd @7% Oxygen<br>Used Oil and Fuel Oil #4 and higher – 125ppmvd @7% Oxygen @7% Oxygen | Fuel Oil/Waste Oil (Batch) – 0.090 lb/Ton<br>Fuel Oil/Waste Oil (Drum) – 0.040 lb/Ton |

The equivalent "lb $NO_x$/ton" asphalt produced are: natural gas- 0.025 lb/ton, #2 fuel oil – 0.040 lb/ton, #4 fuel oil or heavier fuel oils/on-specification used oil 0.050 lb/ton.

Tons per Year (tpy) Reduction

Stack test data (average fuel use and average emissions) and production information were

used to calculate total annual emissions and annual emissions reduction for the State.

Total $NO_x$ emissions of 378 tpy and $NO_x$ emission reduction of 132 tpy were estimated for 2011. Average dryer emissions and emission reductions were calculated by county using the statewide number of dryers (i.e., 70). County numbers were totaled by nonattainment area for 2010 to derive the emission reductions for contingency purposes. Zero growth factor was adopted in the calculations.

Ozone Season Tons per Day (tpd) Reduction

Monthly production information available for limited plants was used to calculate the percent monthly production, which in turn was used to calculate monthly emission reduction for the State. This information, along with the average production days per month (23), was used in calculating tons per day emission reduction during ozone season. The estimated $NO_x$ reduction during ozone season was 0.64 tpd.

Compliance with the new limits is expected to be phased-in over a period of three years based on the asphalt production dryers with the highest maximum gross heat input rates coming into compliance first. Each year, approximately 1/3 of the sources will achieve compliance with the new standards.

1. For an asphalt pavement production dryer with a maximum gross heat input of at least 120 MMBtu/hr or greater shall comply by May 1, 2009.
   Total $NO_x$ reduction in 2009: 43 tpy;
   0.21 tpd ozone season

2. For an asphalt pavement production dryer with a maximum gross heat input of at least 100 MMBtu/hr, but less than 120 MMBtu/hr, shall comply by May 1, 2010.
   Total $NO_x$ reduction in 2010: 86 tpy;
   0.42 tpd ozone season

3. For an asphalt pavement production dryer with a maximum gross heat input rate of less than 100 MMBtu/hr, shall comply by May 12, 2011.

   Total $NO_x$ reduction in 2011: 132 tpy;
   0.64 tpd ozone season

Ozone Season $NO_x$ Reduction by County

Average production per plant and number of plants per county was the basis for the tpd per county calculations.

8. Controls from EGU Consent Decree (PSE&G Hudson $SO_2$)

Emission reductions will be realized between 2006 and 2011 from a settlement with Public Service Electric and Gas Company (PSE&G) at its coal-fired power plants in Jersey City

(Hudson) and Hamilton (Mercer), New Jersey.[6,7] The settlement required additional air pollution controls, lower sulfur coal, lower emissions, and environmental projects. These additional control measures are enforceable in an amended consent decree. The $NO_x$ control reductions were included in the attainment demonstration. A portion of the $SO_2$ reductions were not included in the modeling and are being relied upon for contingency purposes.

The additional measures include:

- Achieving an emission rate on its selective catalytic reduction devices (SCRs) at Mercer Units 1 and 2 of 0.100 lbs/MMBtu on a 90 day rolling average, by January 1, 2007;
- Advanced installation and operation of an flue gas desulfurization (FGD) device (also known as a "scrubber") FGD on Mercer Unit 2 starting in 2010, instead of 2012;
- Operating two new baghouses to control PM and mercury emissions from Mercer Units 1 and 2 by December 31, 2008;
- Limiting fuel to 100% ultra low-sulfur coal by May 1, 2007, comply with a lower interim $SO_2$ emission rate, and meet annual tonnage caps for $SO_2$ and $NO_x$ at Hudson Unit 2 until PSE&G installs a scrubber;
- Installing carbon injection systems to achieve a 90% reduction in mercury emissions at Hudson Unit 2, Mercer Unit 1, and Mercer Unit 2;
- Shutting down Kearny Units 7 and 8 (two uncontrolled oil-fired units), and surrender any $SO_2$ allowances allocated to those units in excess of the operational needs for PSE&G's compliance; and
- Installing PM and Mercury Continuous Emission Monitoring Systems (CEMS).[8]

Table C3 summarizes the pollution controls in the amended consent decree compared to the 2002 consent decree.

[6] USEPA. United States and New Jersey Announce Clean Air Act Settlement with PSE&G Fossil LLC for Violations of 2002 Consent Decree; Utility Required to Pay Significantly Increased Penalties and Reduce Emissions. Accessed from: http://yosemite.epa.gov/opa/admpress.nsf/1ef7cd36224b565785257359003f533f/c59ece80a8a072d1852572360065c298!OpenDocument. November 30, 2006.

[7] State of New Jersey v. PSEG Fossil LLC, Amendment to Consent Decree, Newark Division, New Jersey, U.S. District Court (November 30, 2006). Accessible at http://www.epa.gov/compliance/resources/decrees/amended/psegfossil-amended-cd.pdf.

[8] USEPA. PSEG Fossil L.L.C. Civil Judicial Settlement, http://www.epa.gov/compliance/resources/cases/civil/caa/psegllc.html. Fact sheets, press releases, and consent decrees are available on this site.

**Table C3: Summary of Controls Required in the 2002 Consent Decree Compared to the Amended Consent Decree**

| | Hudson Unit 2 | | Mercer Unit 1 | | Mercer Unit 2 | |
|---|---|---|---|---|---|---|
| | **2002 Consent Decree** | **Amendment** | **2002 Consent Decree** | **Amendment** | **2002 Consent Decree** | **Amendment** |
| **$SO_2$ Controls** | FGD | Interim: use of ultra low sulfur coal until FGD | FGD | No change | FGD | No change |
| **$SO_2$ Control Installation Date** | 12/31/06 | 12/31/2010 | 12/31/2010 | No change | 12/31/2012 | 12/31/2010 |
| **$SO_2$ Emission Rate** | 0.15 lbs/ MMBtu on 30-day avg; 0.25 lbs/MMBtu on 24-hr avg. | Interim: Overall annual $SO_2$ emissions cap and an $SO_2$ emissions rate (30 day average) based on the use of ultra low sulfur coal until the FGD is installed: ≤0.216 lbs/MMBtu - 30 day rolling average emission rate based on one calendar day block basis ≤0.310 lbs/MMBtu - 30 day rolling average emission rate based on one calendar day block basis, when PSEG is not able to get ultra low sulfur coal Adaro coal or coal from Indonesian mines.<br><br>Final: 0.150 lbs/MMBtu on 30-day average; 0.250 lbs/MMBtu on 24-hour average | 0.15 lbs/ MMBtu on 30-day avg; 0.25 lbs/MMBtu on 24-hr avg. | Final: 0.150 lbs/MMBtu on 30-day average; 0.250 lbs/MMBtu on 24-hour average | 0.15 lbs/ MMBtu on 30-day avg; 0.25 lbs/MMBtu on 24-hr avg. | Final: 0.150 lbs/MMBtu on 30-day average; 0.250 lbs/MMBtu on 24-houraverage |
| **$NO_x$ Controls** | SCR | Interim: use of ultra low sulfur coal and SNCR year round | SCR | No change | SCR | No change |
| **$NO_x$ Control Installation Date** | 5/1/07 | SNCR operation by 1/1/2007; SCR installation and operation by 12/31/2010 | 5/1/05 | No change | 5/1/04 | No change |

| | Hudson Unit 2 | | Mercer Unit 1 | | Mercer Unit 2 | |
|---|---|---|---|---|---|---|
| | **2002 Consent Decree** | **Amendment** | **2002 Consent Decree** | **Amendment** | **2002 Consent Decree** | **Amendment** |
| **$NO_x$ Emission Rate** | 0.10 lbs/ MMBtu on 30-day avg; 0.15 lbs/MMBtu on 24-hr avg. | Interim: Overall interim annual $NO_x$ emissions cap and a $NO_x$ emission rate (30 day average) based upon the use of ultra low sulfur coal until SCR is installed. ≤0.300 lbs/MMBtu - 30 day rolling average emission rate based on one calendar day block basis<br><br>Final: SCR $NO_x$ rate of 0.100 lbs/ MMBtu on 30-day avg; 0.150 lbs/MMBtu on 24-hr avg. | 0.13 lbs/ MMBtu on 30-day avg; 0.15 lbs/MMBtu on 24-hr avg. | In addition to existing $NO_x$ emission rates, 0.100 lbs/MMBtu on 90-day avg. by 1/1/2007 | 0.13 lbs/ MMBtu on 30-day avg; 0.15 lbs/MMBtu on 24-hr avg. | In addition to existing $NO_x$ emission rates, 0.100 lbs/MMBtu on 90-day avg. by 1/1/2007 |
| **PM Controls** | Optimize ESP and install polishing baghouse | Install Full size baghouse to replace ESP | Optimize and/or upgrade existing ESP | Install new baghouse to replace ESP | Optimize and/or upgrade existing ESP | Install new baghouse to replace ESP |
| **PM Control Installation Date** | Optimization by 12/31/02; Baghouse by 12/31/06 | Operate existing ESP and fly ash conditioner by 1/7/2006; Install and operate baghouse by 12/31/2010 | 12/31/02 (est.) | 12/31/2008 | 12/31/02 (est.) | 12/31/2008 |
| **PM Emission Rate** | 0.015 lbs/MMBtu | 0.0150 lbs/MMBtu | 0.03 lbs/MMBtu | 0.0150 lbs/MMBtu | 0.03 lbs/MMBtu | 0.0150 lbs/MMBtu |
| **Continuous Emission Monitoring Systems (CEMS)** | Mercury or PM CEMS | Mercury and PM CEMS | Mercury or PM CEMS | Mercury and PM CEMS | Mercury or PM CEMS | Mercury and PM CEMS |
| **Mercer Controls** | None | Carbon Injection by Dec 31, 2010 | None | Carbon Injection by Jan 1, 2007 | None | Carbon Injection by Jan 1, 2007 |

Paragraph 123 of the original Consent Decree required PSE&G Hudson (Unit 2) and Mercer (Units 1 and 2) to comply with the following annual $NO_x$ and $SO_2$ emission levels which were based on permitted levels at that time.

> Total $NO_x$ emissions: 16,444 tpy in any calendar year after December 31, 2005 for Hudson Unit 2, Mercer Unit 1, and Mercer Unit 2.
>
> Total $SO_2$ emissions: 29,948 tons of $SO_2$ in any calendar year after December 31, 2006 for Hudson Unit 2, Mercer Unit 1, and Mercer Unit 2.

Based upon the amended consent decree, Hudson (Unit 2) is required to meet the lower interim annual emission caps for $NO_x$ and $SO_2$:

**Table C4: Interim Annual $NO_x$ and $SO_2$ Emission Limits for Hudson (Unit 2)**

| Year | $SO_2$ (tpy) | $NO_x$ (tpy) |
|---|---|---|
| 2007 | 5,547 | 3,486 |
| 2008 | 5,270 | 3,486 |
| 2009 | 5,270 | 3,486 |
| 2010 | 5,270 | 3,486 |

For contingency purposes, emission reductions from the interim $SO_2$ annual emission caps and the use of ultra-low sulfur coal for Hudson (Unit 2) are used. The calculations are provided below:

**$SO_2$:**

In order to determine emission reductions from the settlement caps, the consent decree interim annual emissions cap was subtracted from the previous permitted limit, which are listed.

- Hudson Permitted $SO_2$ emissions = 56,394 tpy
- Amended Consent Decree $SO_2$ emissions limit in 2010 = 5,270 tpy

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- Total $SO_2$ emission benefits for Hudson: 56,394 tpy – 5,270 tpy = 51,124 tpy

The interim $SO_2$ control measures for Hudson 2 were not included in the photochemical modeling to demonstrate attainment (see Chapter 5), and therefore can be used for contingency. The emission reductions are relied upon for contingency in the final SIP revision.

Additional $SO_2$ and PM control measures in the 2002 consent decree and amendments that are required by 2010 will also provide future emission reductions (refer to Table C3). As part of the settlement, PSE&G will fund $3.25 million in diesel engine retrofit/replacement projects for New Jersey. These projects involve the upgrade of three CSX switcher

locomotives from Tier 0 to Tier 3 nonroad engines plus diesel particulate filters on all three. Thus, there will be more emission reductions achieved in the future to ensure attainment of the 15 $\mu g/m^3$ annual NAAQS and to provide progress toward the New Jersey goal of 12 $\mu g/m^3$.

9. Refinery Consent Decrees (Sunoco and Valero)

As discussed in Chapter 4, the USEPA and various state and local agencies have negotiated Consent Decrees with major refineries to elicit emission reductions from five major refinery processes: Fluid Catalytic Cracking Units (FCCUs) and Fluid Coking Units (FCUs), Process Heaters and Boilers, Flare Gas Recovery, Leak Detection and Repair (LDAR), and Benzene/Wastewater. The estimated emission reductions for $PM_{2.5}$, $NO_x$, and $SO_2$ are shown in Table C5. The emission reduction calculations are shown in Table 3.1 (Emission Inventory for Boilers/Heaters) and Appendix A (Methodology from Estimating Emission Reductions from Model Rules) of the MARAMA Refinery report,[9] which can be found in Appendix A4 and at http://www.marama.org/Projects/. The consent decrees are included in Attachments 3-5 of Appendix C. Additional emission reductions from VOC are also anticipated that are not shown in Table C5.

**Table C5: Refinery Consent Decree Emission Reductions**

| | | | | Emission Reductions 2009 (tpy) | | |
|---|---|---|---|---|---|---|
| **Refinery Process** | **Refinery** | **County** | **Nonattainment Area** | **$PM_{2.5}$** | **$NO_x$** | **$SO_2$** |
| Fluid Catalytic Cracking Units (FCCUs) | Sunoco | Gloucester | SNJ/Phila. | 34 | 56 | 86 |
| | Valero | Gloucester | SNJ/Phila. | 0 | 0 | 3,425 |
| | ConocoPhillips | Union | NNJ/NY/CT | 0 | 561 | 0 |
| Flares | Sunoco | Gloucester | SNJ/Phila. | 0 | 0 | 0 |
| | Valero | Gloucester | SNJ/Phila. | 0 | 0 | 0 |
| | ConocoPhillips | Union | NNJ/NY/CT | 0 | 0 | 0 |
| Boilers and Process Heaters | Sunoco | Gloucester | SNJ/Phila. | 0 | 407 | 25 |
| | Valero | Gloucester | SNJ/Phila. | 0 | 275 | 0 |
| | ConocoPhillips | Union | NNJ/NY/CT | 0 | 534 | 0 |
| | | | TOTAL | 34 | 1,833 | 3,536 |
| | | | TOTAL SNJ/Phila. NAA | 34 | 738 | 3,536 |

Notes:

1. Source of Emission Reductions: "Assessment of Control Technology Options for Petroleum Refineries in the Mid-Atlantic Region: Final Technical Support Document." Prepared for the Mid-Atlantic Regional Air Management Association (MARAMA) by MACTEC Federal Programs, Inc., January 31, 2007, Table 3.1 (Emission Inventory for Boilers/Heaters) and Appendix A (Methodology from Estimating Emission Reductions from Model Rules).

[9] MARAMA. Assessment of Control Technology Options for Petroleum Refineries in the Mid-Atlantic Region: Final Technical Support Document. Prepared for the Mid-Atlantic Regional Air Management Association (MARAMA) by MACTEC Federal Programs, Inc., January 31, 2007. Accessible at http://www.marama.org/Projects/.

2. Additional reductions are attained that are not shown because these numbers do not have emissions from growth removed.

The refinery consent decrees were included in the attainment demonstration photochemical modeling for $PM_{2.5}$. For the purposes of satisfying the contingency requirements, New Jersey is allocating 738 tpy of the emission reductions provided by the refinery consent decrees in the Southern New Jersey/Philadelphia nonattainment area. An analysis of how the attainment demonstration photochemical modeling indicates more emission reductions than needed to attain the $PM_{2.5}$ standard and why these modeled measures can also be used as contingency is presented in the following section.

Modeling Differential for Contingency

In addition to the eight measures listed in Table 6.1, to meet the contingency requirements for $PM_{2.5}$, New Jersey is also using emission reductions that are above and beyond what is needed for attainment ("modeled differential") for the New Jersey portion of the Southern New Jersey/Philadelphia nonattainment area. Some of the modeling differential can be assigned to the emission reductions achieved from the refinery consent decrees. The analysis of how New Jersey is meeting the contingency requirement using this approach is outlined here.

STEP 1: Compare Modeling Concentrations and Emission Inventories at New Jersey Monitoring Sites

New Jersey monitors that were modeled for the attainment demonstration in the New Jersey portion of the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas showed a decrease in the annual concentrations of $PM_{2.5}$ from 2002 to 2009. The associated emissions of direct $PM_{2.5}$, $NO_x$, and $SO_2$ within each New Jersey county that has a monitor from 2002 to 2009 demonstrate that significant emission reductions were achieved to produce an air quality benefit at the monitors.

## Table C6:
## Modeling Concentrations and Emissions Inventory by County for 2002 and 2009 at the New Jersey Monitoring Sites

| Site ID | Monitoring Site Name | County | Modeling 2002 Average Annual Baseline Conc. ($\mu g/m^3$) | Projected 2009 Annual Conc. ($\mu g/m^3$) | Air Quality Change (2002-2009 Modeled) ($\mu g/m^3$) | 2002 County Emissions (tpy) | | | 2009 County Emissions (tpy) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Direct $PM_{2.5}$ | $NO_x$ | $SO_2$ | Direct $PM_{2.5}$ | $NO_x$ | $SO_2$ |
| 340011006 | Atlantic City | Atlantic | 11.5 | 9.9 | -1.6 | 1,010 | 8,330 | 880 | 926 | 5,719 | 638 |
| 340030003 | Fort Lee Library | Bergen | 13.7 | 11.9 | -1.8 | 1,801 | 26,840 | 1,739 | 1,698 | 16,862 | 1,064 |
| 340070003 | Camden | Camden | 14.3 | 12.3 | -2.0 | 1,289 | 15,372 | 1,908 | 1,157 | 9,201 | 922 |
| 340071007 | Pennsauken | Camden | 14.3 | 12.4 | -1.9 | | | | | | |
| 340130015 | Newark Cultural Center | Essex | 13.9 | 11.8 | -2.1 | 1,520 | 24,594 | 4,316 | 1,246 | 14,123 | 3,331 |
| 340130016 | Newark Lab | Essex | 14.7 | 12.5 | -2.1 | | | | | | |
| 340155001 | Clarksboro | Gloucester | 13.7 | 11.8 | -1.8 | 1,303 | 14,515 | 7,169 | 1,462 | 9,494 | 3,476 |
| 340171003 | Jersey City Primary | Hudson | 14.9 | 13.0 | -1.9 | 2,002 | 22,047 | 21,409 | 1,646 | 10,866 | 12,064 |
| 340172002 | Union City | Hudson | 16.2 | 14.1 | -2.1 | | | | | | |
| 340210008 | Trenton | Mercer | 13.9 | 11.8 | -2.1 | 1,236 | 25,520 | 15,508 | 1,653 | 9,957 | 4,270 |
| 340218001 | Washington Crossing | Mercer | 11.9 | 10.1 | -1.8 | | | | | | |
| 340230006 | New Brunswick | Middlesex | 12.5 | 10.5 | -2.0 | 1,977 | 26,835 | 2,115 | 1,811 | 16,704 | 1,239 |
| 340270004 | Morristown | Morris | 12.4 | 10.5 | -1.9 | 1,663 | 15,708 | 1,234 | 1,536 | 9,586 | 894 |
| 340273001 | Chester | Morris | 11.1 | 9.4 | -1.7 | | | | | | |
| 340292002 | Toms River | Ocean | 11.5 | 9.7 | -1.8 | 2,256 | 10,421 | 1,074 | 2,023 | 7,300 | 762 |
| 340310005 | Paterson | Passaic | 13.2 | 11.2 | -2.0 | 1,021 | 9,836 | 760 | 930 | 6,019 | 533 |
| 340390004 | Elizabeth | Union | 15.7 | 13.3 | -2.4 | 1,380 | 18,850 | 3,503 | 1,293 | 11,746 | 2,189 |
| 340390006 | Elizabeth Downtown | Union | 13.5 | 11.6 | -2.0 | | | | | | |
| 340392003 | Rahway | Union | 13.1 | 11.2 | -2.0 | | | | | | |
| 340410006 | Phillipsburg | Warren | 13.4 | 11.7 | -1.7 | 1,031 | 5,250 | 565 | 958 | 3,065 | 464 |

STEP 2: Calculate Average Modeling Concentrations for the New Jersey Portion of the Nonattainment Areas

The average 2002 and 2009 modeled $PM_{2.5}$ annual concentrations were calculated for the New Jersey portions of the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas, respectively. The modeling predicted an average 2.0 and 1.9 $\mu g/m^3$ decrease in $PM_{2.5}$ at New Jersey monitors in the New Jersey portion of the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas, respectively. The 2002 modeling inventory and the projected 2009 modeling inventory (refer to Chapter 5 for additional information on the emission inventories used for this final SIP revision) for the New Jersey counties in each nonattainment area demonstrates significant emission reductions associated with the improved air quality benefits predicted.

**Table C7:**
**Average Modeling Concentrations for the New Jersey Portion of the Nonattainment Areas**

| New Jersey Portion of NAA | Average Modeling 2002 Average Annual Baseline Conc. ($\mu g/m^3$) | Average Projected 2009 Annual Conc. ($\mu g/m3$) | Model Predicted Change in DV from 2002 to 2009 ($\mu g/m3$) | 2002 NAA Emissions (tpy) | | | 2009 NAA Emissions (tpy) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Direct $PM_{2.5}$ | $NO_x$ | $SO_2$ | Direct $PM_{2.5}$ | $NO_x$ | $SO_2$ |
| **NNJ/NY/CT** | 13.6 | 11.6 | -2.0 | 15,797 | 198,518 | 52,889 | 14,752 | 113,690 | 26,811 |
| **SNJ/Phila.** | 14.1 | 12.2 | -1.9 | 4,485 | 48,409 | 12,506 | 4,336 | 30,928 | 5,712 |

STEP 3: Calculate an Average Ratio of Emission Inventory Reductions to Modeling Design Values for the New Jersey Portion of the Nonattainment Areas ($tpy/\mu g/m^3$)

In order to determine the modeled differential in tons per year using the predicted change in $PM_{2.5}$ concentration, a ratio of the predicted change in emissions inventory from 2002 to 2009 to the predicted change in the modeled design values (DVs) was calculated for each $PM_{2.5}$ precursor using the following equation:

[2002 emissions (tpy)] - [2009 emissions (tpy)] / [2002 modeling DV ($\mu g/ m^3$)] - [2009 modeling DV ($\mu g/m^3$)] = Change in emissions inventory (tpy) / Predicted change in modeled DVs ($\mu g/ m^3$)

**Table C8:**
**Ratio of Emissions from New Jersey Portion of Nonattainment Areas to Average Modeling Design Values ($tpy/\mu g/m^3$)**

| New Jersey Portion of NAA | $PM_{2.5}$ ($tpy/\mu g/m^3$) | $NO_x$ ($tpy/\mu g/m^3$) | $SO_2$ ($tpy/\mu g/m^3$) |
|---|---|---|---|
| **NNJ/NY/CT NAA** | 525 | 42,630 | 13,105 |
| **SNJ/Phila. NAA** | 77 | 9,053 | 3,518 |

STEP 4: Apply Conversion Factor from Step 3 to Contingency Requirements

The conversion factors calculated from Step 3 were applied to the air quality benefits in each New Jersey portion of the nonattainment areas that were achieved below the $PM_{2.5}$ annual standard of 15.0 $\mu g/m^3$. The process to calculate the modeled differential is outlined here:

1. The modeled average $PM_{2.5}$ annual concentration for 2009 for New Jersey monitors in the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas are 11.6 and 12.2 $\mu g/m^3$, respectively.

2. The $PM_{2.5}$ annual standard is 15.0 $\mu g/m^3$.

3. Therefore, the measures modeled for 2009 provided more reductions than needed to meet the annual standard.

4. The 2009 modeling scenario provided an additional air quality benefit of 3.4 and 2.8 $\mu g/m^3$ above the standard in the New Jersey portion of the Northern New Jersey/New York/Connecticut and Southern New Jersey/Philadelphia nonattainment areas, respectively.

5. Applying the conversion factor from Step 3, the additional air quality benefit can be converted to tpy for each $PM_{2.5}$ precursor.

**Table C9:**
**Modeled Differential**
**New Jersey Portion of Nonattainment Areas**

| New Jersey Portion of NAA | NNJ/NY/CT NAA | SNJ/Phila. NAA | |
|---|---|---|---|
| **Direct $PM_{2.5}$:** | 1,785 | 216 | tpy modeled differential emission reductions |
| **$NO_x$:** | 144,943 | 25,348 | tpy modeled differential emission reductions |
| **$SO_2$:** | 44,559 | 9,851 | tpy modeled differential emission reductions |

STEP 5: Compare Refinery Consent Decree Emission Reductions to Modeled Differential Emissions to Determine Compliance with Contingency Requirements

In order to meet the contingency requirement for the New Jersey portion of the Southern New Jersey/Philadelphia nonattainment area (refer to Chapter 6 for complete details), 738 tpy of total emission reductions remain that were not achieved by the eight contingency measures listed in Table 6.1. The modeled differential (calculated in Step 4) can be partly attributed to the emission reductions achieved by the refinery consent decrees at Sunoco and Valero. New Jersey is relying upon 738 tpy of the emission reductions that are above and beyond what is needed for attainment from those refinery consent decrees to meet contingency requirements.

## Table C10:
## Refinery Consent Decree Emission Reductions Compared to Modeled Differential Emissions to Determine Compliance with Contingency Requirements

| | $PM_{2.5}$ | $NO_x$ | $SO_2$ | TOTAL |
|---|---|---|---|---|
| Contingency Requirement (1/7) (tpy) (for New Jersey portion of SNJ/Phila. NAA) (see Chapter 6) | 21 | 2,497 | 971 | 3,489 |
| Emission Reductions from Proposed Contingency Measures except for Refinery Consent Decrees (tpy) | 34 | 2,685 | 32 | 2,751 |
| **Remaining Emission Reductions Needed to Meet Contingency Requirement (tpy)** | -13 | -188 | 939 | **738** |
| Modeled Differential Emission Reductions Available for New Jersey portion of SNJ/Phila. NAA (tpy) | 216 | 25,348 | 9,851 | 35,415 |
| Emission Reductions for New Jersey portion of SNJ/Phila. NAA from Refinery Consent Decrees (tpy) (Table C5) | 34 | 738 | 3,536 | 4,308 |
| **Emission Reductions Allocated as Contingency from Refinery Consent Decrees (tpy)** | 0 | 0 | 738 | **738** |
| Remaining Refinery Consent Decree Emission Reductions (tpy) (not needed for contingency) | 34 | 738 | 2,798 | 3,570 |
| Remaining Modeled Differential Emission Reductions for New portion of SNJ/Phila. NAA (tpy) | 216 | 25,348 | 9,113 | 34,677 |