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FINAL SUMITTAL

AMENDMENTS TO

THE DELAWARE 1999 RATE-OF-PROGRESS PLAN FOR KENT AND NEW CASTLE COUNTIES

(Submitted to US EPA in December 1997)

For Demonstrating
Progress Toward Attainment of the National Ambient Air Quality Standard for Ground-Level Ozone

Submitted by
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Dover, Delaware

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List of Acronyms

AQM:	Air Quality Management Section
BEA:	Bureau of Economic Analysis
CAAA :	Clean Air Act Amendments of 1990
CE:	Control Efficiency
CMSA :	Consolidated Metropolitan Statistical Area
CO:	Carbon Monoxide
DelDOT:	Delaware Department of Transportation
DNREC:	Delaware Department of Natural Resources and Environmental Control
EPA:	United States Environmental Protection Agency
ER:	Emission Reduction
GF:	Growth Factor
mmBTU:	Million British Thermal Unit
MOU:	Memorandum Of Understanding
MW:	Megawatt
NAA:	Non-Attainment Area
NAAQS:	National Ambient Air Quality Standard
NOx:	Oxides of Nitrogen
OTC:	Ozone Transport Commission
OTR:	Ozone Transport Region
RACT:	Reasonably Available Control Technology
RE:	Rule Effectiveness
RP:	Rule Penetration
RPP:	Rate-of-Progress Plan
SCC:	Source Classification Code
SIC:	Standard Industrial Classification
SIP:	State Implementation Plan

TPD: Tons Per Day
TPY: Tons Per Year

VOC: Volatile Organic Compound
VRS: Vapor Recovery System

List of References

1. *Federal Clean Air Act*, 42 U.S.C.A. '7401 et seq., as amended by the Clean Air Act Amendments of 1990, P.L. 101-549, November 15, 1990.

2. *NO_x Substitution Guidance*, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, December, 1993.

3. *The Delaware 1999 Rate-of-Progress Plan for Kent and New Castle Counties*, Department of Natural Resources and Environmental Control, Air Quality Management Section, Dover, Delaware, December 1997.

4. *The Delaware 15% Rate-of-Progress Plan*, Department of Natural Resources and Environmental Control, Air Quality Management Section, Dover, Delaware, February, 1995.

5. *Delaware Regulations Governing the Control of Air Pollution*, Division of Air and Waste Management, Delaware Department of Natural Resources and Environmental Control, Dover, Delaware, Updated to March 8, 1995.

6. *Memorandum of Understanding among the States of the Ozone Transport Commission on Development of a Regional Strategy Concerning the Control of Stationary Source Nitrogen Oxide Emissions*, Stationary and Area Source Committee, Ozone Transport Commission, Washington, D.C., September 1994.

7. *The 1990 OTC NOx Baseline Emission Inventory*, EPA-454/R-95-013, Office of Air Quality Planning and Standards, US EPA, Research Triangle Park, North Carolina, July 1995.

8. *NOx Budget Program Regulation No. 27*, Department of Natural Resources and Environmental Control, Air Quality Management Section, Dover, Delaware, December 1997.

9. *Guidance on the Post-1996 Rate-of-Progress Plan and the Attainment Demonstration*, Office of Air Quality Planning and Standards, US EPA, Research Triangle Park, North Carolina, February 1994.

10. *Guidance on Issues Related to 15 Percent Rate-of-Progress Plans*, Policy memorandum, M.H. Shapiro, Acting Assistant Administrator for Air and Radiation, US EPA, Washington D.C., August 23, 1993.

11. *Procedures for Emission Inventory Preparation Vol. IV: Mobile Sources*, EPA-450/4-81-026d (Revised), Office of Air and Radiation and Office of Mobile Sources, US EPA, Ann Arbor, Michigan, and Office of Air Quality Planning and Standards, US EPA, Research Triangle Park, North Carolina, 1992.

1. INTRODUCTION

The Clean Air Act Amendments of 1990 (Ref. 1, hereafter referred to as CAAA) set forth National Ambient Air Quality Standards (NAAQS) for six air pollutants. Two counties in Delaware, i.e., Kent and New Castle, exceed the 1-hour ground-level ozone standard, and have been classified by US Environmental Protection Agency (EPA) as severe nonattainment areas. Under Section 182(d) of the CAAA, Delaware is required to submit to EPA a revision of its State Implementation Plan (SIP), for every 3-year period after 1996, that achieves an actual VOC emission reduction of at least 3% per year over the 3-year period for these two counties. Under certain conditions, the CAAA allows substitution of anthropogenic nitrogen oxides (NO_x) emission reductions for the post-1996 VOC emission reduction requirements (Ref. 2). The revision of Delaware's SIP for the period of 1996-1999, termed as Delaware 1999 Rate-of-Progress Plan was submitted to EPA in December, 1997 (Ref. 3, hereafter referred to as the Delaware 1999 RPP or simply 1999 RPP). Detailed information regarding the CAAA's requirements for attaining the 1-hour NAAQS for the ground-level ozone, as well as Delaware's state implementation plans for meeting these requirements, can be found in Delaware's 1999 RPP (Ref. 3).

This document contains amendments to Delaware's 1999 Rate-of-Progress Plan submitted to EPA in December, 1997. The document will specify individual portions of the original 1999 RPP that are being amended. In brief, the amendments include (1) reevaluations of some VOC and NOx emission reductions in Part III of the 1999 RPP, (2) recalculation of VOC and NOx emission reductions in the milestone year of 1999 to meet the rate-of-progress requirements, and (3) development of a contingency plan for the 1999 RPP. The portions in the original 1999 RPP that are not amended by this document remain valid.

The agency with direct responsibility for preparing and submitting this document is the Delaware Department of Natural Resources and Environmental Control (DNREC), Division of Air and Waste Management, Air Quality Management Section (AQM), under the direction of Darryl D. Tyler, Program Administrator. The working responsibility for Delaware's air quality planning falls within the Planning and Community Protection Branch of the Air Quality Management Section of DNREC, under the management of Raymond H. Malenfant, Program Manager. Alfred R. Deramo, Program Manager of Emissions Research, Planning and Attainment Group within the Planning and Community Protection Branch, is the project manager and chief editor of this document. The following personnel under Alfred R. Deramo are instrumental in preparing this document:

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2. REEVALUATIONS OF VOC AND NOx EMISSION REDUCTIONS

2.1 VOC Emission Reductions from Benzene Waste Rule and Delaware Regulation 24.28

This subsection shall replace the corresponding subsection on page 3-43 of the 1999 RPP, entitled "3. Benzene Waste Rule".

The waste water treatment system at the facility of Motiva Enterprises (formerly Star Enterprise) in New Castle County (Point 50, SCC 30600503) is subject to the National Emission Standards for Hazardous Air Pollutants (NESHAP), Benzene Waste Rule (40CFR61 Subpart FF), and Section 28 of Delaware Air Regulation 24 (Ref. 5, hereafter referred to as *Regulation 24.28*). Process modifications and emission controls having been planned and implemented for the system to comply with the above rule and regulation can reduce VOC emissions significantly. A detailed discussion of these process modifications and the associated VOC emission reductions is included in Appendix M, as amended in and attached to this document. The 1999 Control Strategy Projection emissions are determined using point source projection Equation P-3 (page 3-10, 1999 RPP) with a control efficiency of 86.6% as derived and explained in the amended Appendix M.

As calculated in the amended Appendix M, the 1999 Control Strategy Projection for VOC emissions from Motiva's wastewater treatment plant is 0.763 TPD in the peak ozone season. The corresponding 1999 Current Control Projection for this source is 2.485 TPD. Thus, the total VOC emission reduction from this source is:

$$ER_{1999}\ (\text{TPD}) = 2.485 - 0.763 = 1.722 \text{ TPD in the peak ozone season}$$

The VOC emission reductions expected at Motiva's wastewater treatment plant are from process modifications and controls planned by Motiva to comply with either the Federal Benzene Waste Rule or Delaware Air Regulation 24.28 for petroleum refinery. In July 1992, DNREC acknowledged a total of 75 TPY VOC emission reductions from the spill diversion tank (a component unit of the wastewater treatment system) to offset VOC emissions from Motiva's then-planned ether project (DNREC Secretary's Order No. 92-0044, July 14, 1992). Since Motiva has estimated that the ether project would lead to a VOC emission increase of only 66.5 TPY, an extra credit of 8.5 TPY (i.e., 75 - 66.5 = 8.5 TPY) could remain unused. Delaware decides not to use this extra 8.5 TPY credit in its 1999 RPP. It should be pointed out that the 1.722 TPD VOC emission reductions calculated above do not include this extra acknowledged credit (Appendix M).

2.2 NOx Emission Reductions from Delaware RACT Applicable Point Sources in Kent County

This subsection amends Table 3-15 of the original 1999 RPP (page 3-50), entitled "NOx Emission Reductions from Delaware NOx RACT Applicable Sources in Kent County". The

amended Table 3-15 provided herein shall replace the original Table 3-15.

In the original Table 3-15, six sources (or nine records) in Kent County are listed as affected by Delaware NOx RACT regulations (Ref. 5). Among them, the sources of Dover Electric and the source of Kraft General Foods have become affected by Delaware Air Regulation 37, the NOx Budget Program (Ref. 8), after the regulation was promulgated in April 1999. Emission reductions from these sources can be found in Table 3-19 (Amended) in the next subsection of this document. As a result, only the three sources at Dover Air Force Base are still affected by the relevant NOx RACT controls. The amended Table 3-15 lists these three sources and the corresponding NOx emission reductions from them. Calculations of emission reductions from these three sources presented in the original 1999 RPP remain valid. As shown in the amended table, the total NOx emission reductions from these three sources are 0.018 TPD. Delaware will take this 0.018 TPD reduction, instead of 1.051 TPD as indicated in the original Table 3-15, as reduction credit to meet the rate-of-progress requirements for the milestone year of 1999.

Table 3-15 (Amended)
NOx Emission Reductions from Delaware NOx RACT Applicable Point sources in Kent County (in TPD)

Plant Name	**Point**	**Source SCC**	**1990 Emission** (TPD)	**1990 Emission Rate** (lb/mmBTU)	**Applicable Control Technology**	**1990 Capacity Factor** (%)	**Control Efficiency** (%)	**Growth Factor**	**Current Control Proj.** (a)	**Control Strategy Proj.** (b)	**1999 NOx Emission Reduction** (c)=(a)-(b)
Dover Air Force Base	1	1-03-004-01	0.050	0.367	LNB[1]	--	35.0	1.10	0.055	0.040	0.015
	2	1-03-004-01	0.030	0.368	<5% Capacity[2]	13.38	8.4	1.10	0.033	0.031	0.002
	4	1-03-004-01	0.017	0.372	<5% Capacity	7.63	2.6	1.10	0.019	0.018	0.001
Total Reduction (TPD)											**0.018**

[1] Low NOx Burning technology.
[2] Operation at less than 5% maximum capacity during the peak ozone season.

2.3 NOx Emission Reductions from OTC Regional Controls and Delaware Regulation 37

This subsection shall replace a corresponding subsection from page 3-53 to page 3-57 in the 1999 RPP, entitled "7. OTC Regional NOx MOU Controls for Stationary Sources".

In late 1994, the States of the Ozone Transport Commission (OTC), including Delaware, adopted a Memorandum of Understanding (MOU) on emission reductions from certain large stationary NOx sources within the Ozone Transprt Region (Ref. 6). The OTC MOU specifies regional control strategies that require reductions in NOx emissions from fossil fuel-fired boilers and indirect heat exchangers with maximum gross heat input of at least 250 million British thermal units per hour (mmBTU/hr) and electric generating units greater or equal to 15 megawatts (MW). The MOU requires the OTC States to develop regulations for the control of NOx emissions from those NOx sources in two phases, i.e., Phase II and Phase III. Further, the MOU specifies the level of reductions in the OTC's "Inner Zone" consisting of central eastern portion of the OTC, and the "Outer Zone" consisting of the remainder of the OTR. For Delaware, Kent and New Castle Counties fall in the inner zone and Sussex in the outer zone.

The Phase II of the OTC regional control strategy requires the affected sources to reduce NOx emissions by 65% of their 1990 emission levels, or to limit NOx emission rates below 0.20 lbs/mmBTU, by May 1, 1999. The Phase III strategy requires a NOx emission reduction of 75% of the 1990 level, or an emission rate limit of 0.15 lbs/mmBTU, by May 1, 2003. The OTC States have developed *the 1990 OTC NOx Baseline Emission Inventory* (Ref. 7). In this document, the OTC States have (1) developed the 1990 NOx emission baselines for all relevant sources, and (2) established for these sources emission budgets in terms of total emissions to be allowed between May 1 and September 30 starting from 1999 (Phase II) and from 2003 (Phase III). The established 5-month budgets, with limited reserves, will serve as NOx emission caps for the affected sources during the regulated season, i.e., from May 1 to September 30, in the years of corresponding phases.

The OTC MOU Phase II requirements affect Delaware's 1999 Rate-of-Progress Plan. To fulfill the Phase II requirements, Delaware has promulgated its Air Regulation 37, which contains a compliance deadline of May 1999 (Ref. 8, hereafter referred to as *Regulation 37*). Sources in Kent and New Castle Counties covered by *Regulation 37* are listed in Table 3-19 (Amended) along with their SCC codes and 1990 baseline 5-month emission levels.

Based on the OTC MOU Phase II allocated budgets and reserves, the 5-month emission allowances (i.e., the total emissions allowed between May 1 and September 30) have been set forth in *Regulation 37* for individual sources listed in Table 3-19 (Amended). Due to the capping nature of the allowances, the control strategy projections for all these sources are calculated using point source projection Equation P-5, as presented in the 1999 RPP (page 3-11). The emission reductions from these sources in 1999 (ER_{1999}) are obtained using the following equation

$$ER_{1999} = EMIS_{1999\text{-current control}} - EMIS_{1999\text{-control strategy}}$$

where $EMIS_{1999\text{-current control}}$ is the current control projection emission as determined in Part II of the 1999 RPP, and $EMIS_{1999\text{-control strategy}}$ is the control strategy projection emission as determined using Equation P-5. The following is an example of how to calculate NOx emission reduction from an affected source.

Example: NOx Emission Reduction from Implementing OTC Regional Control and Delaware *Regulation 37*

Delmarva Power Edge Moor Point 002 (Table 3-19, amended) in New Castle County is a source covered by *Regulation 37*. Emission and control data for this source are as follows:

CRTPOL	= 4.552 TPD in peak ozone season;
$EMIS_{by5}$	= 655.8 tons in 5 months (May 1 to Sept. 30 in 1990 Base Year);
ER_{py5}	= 242 tons in 5 months (*Regulation 37* allowance, May 1 to Sept. 30 in 1999);
RULEFF	= 100% (i.e., no rule effectiveness)
RE_{py}	= 80%.

The 1999 control strategy projection for this source can be obtained using Equation P-5:

$$EMIS_{py}(TPD) = 4.552(TPD) \times \frac{242(ton/5mon)}{655.8(ton/5mon)} \times \frac{(200-80)/100}{(200-100)/100} = 2.016\,TPD$$

The 1999 current control projection of this source is 4.134 TPD (from page F-76, Appendix F, 1999 RPP). Thus, the NOx emission reduction from this source for the 1999 RPP is

$$ER_{1999} = 4.134 \text{ TPD} - 2.016 \text{ TPD} = 2.118 \text{ TPD}$$

Following the same procedures, the NOx emission reductions from all sources in Kent and New Castle Counties covered by *Regulation 37* can be obtained. The results are summarized in Table 3-19 (Amended). In Table 3-19 (Amended), sources of Dover Electric and First State Power are located in Kent County, and all other sources are located in New Castle County. The sum of NOx emission reductions from sources in Kent County is 1.491 TPD, while the sum of NOx emission reductions from sources in New Castle County is 27.416 TPD. The total NOx emission reductions from the two counties due to implementation of *Regulation 37* is 28.907 TPD in the peak ozone season. Delaware will take this 28.907 TPD NOx emission reduction, instead of 24.650 TPD as indicated in the original Table 3-19 in the 1999 RPP, as reduction credit to meet the rate-of-progress requirements for the milestone year of 1999.

Table 3-19 (Amended)
Sources Affected by OTC NOx MOU Phase II Regional Controls* and Projected Emission Reductions (in TPD)

Plant Name* **	**Point**	**Source SCC**	**1990 Emission** (TPD)	**1990 Emission Baseline** (Ton/5month)	**MOU Phase II Emission Allowance** (Ton/5month)	**1999 Current Control Projection** (TPD)	**1999 Control Strategy Projection** (TPD)	**NOx Emission Reduction**** (TPD)
Delmarva Power Delaware City	002	2-01-001-01	0.003	0.6	2.0	0.003	0.013	-0.010
Delmarva Power Edge Moor New Castle County	001	2-01-001-01	0.012	0.7	2.0	0.011	0.041	-0.030
	002	1-01-002-12 1-01-004-04 1-01-005-01	4.552	655.8	242.0	4.134	2.016	2.118
	003	1-01-002-12 1-01-004-04 1-01-005-01 1-01-006-04	8.009	928.7	346.0	8.581	3.580	5.001
	004	1-01-004-01 1-01-005-01 1-01-006-01	12.138	1,436.0	650.0	17.865	6.589	11.276
Delmarva Power Hay Road New Castle County	001	2-01-001-01 2-01-002-01	0.575	49.0	50.0	0.791	0.704	0.087
	002	2-01-001-01 2-01-002-01	0.329	33.6	35.0	0.450	0.411	0.039
Dover Electric McKee Run Kent County	001	1-01-004-01 1-01-005-01 1-01-006-01	0.903	91.6	73.0	0.660	0.863	-0.203
	002	1-01-004-01 1-01-005-01 1-01-006-01	0.429	56.3	45.0	0.445	0.411	0.034
	003	1-01-004-01 1-01-005-01 1-01-006-01	2.980	411.7	186.0	3.577	1.615	1.962

Table 3-19 (Amended) (Continued)

Sources Affected by OTC NOx MOU Phase II Regional Controls* and Projected Emission Reductions (in TPD)

Plant Name* **	**Point**	**Source SCC**	**1990 Emission** (TPD)	**1990 Emission Baseline** (Ton/5month)	**MOU Phase II Emission Allowance** (Ton/5month)	**1999 Current Control Projection** (TPD)	**1999 Control Strategy Projection** (TPD)	**NOx Emission Reduction**** (TPD)
First State Power Kent County	001	1-02-002-19 1-02-004-05	1.431	201.2	203.0	1.431	1.732	-0.301
Motiva Enterprises Delaware City New Castle County	006	3-06-001-06 3-06-001-11	0.370	104.3	105.0	0.399	0.446	-0.047
	019	3-06-001-06	0.137	20.1	21.0	0.147	0.171	-0.024
	034	3-06-001-06	0.470	69.5	71.0	0.507	0.576	-0.069
	067	1-01-004-01 1-01-007-01	1.354	229.0	94.0	1.321	0.667	0.654
	068	1-01-004-01 1-01-007-01 1-01-008-01	4.241	588.5	207.0	4.581	1.790	2.791
	069	1-01-004-01 1-01-007-01 1-01-008-01	4.301	647.4	228.0	4.646	1.818	2.828
	070	1-01-004-01 1-01-007-01 1-01-008-01	4.324	610.7	216.0	4.670	1.835	2.835
	074	3-06-001-06	0.263	116.7	118.0	0.284	0.318	-0.034
Total Reductions	(TPD)							**28.907**

* The OTC Phase II NOx Control Strategy has been implemented in Delaware via Delaware Air Pollution Regulation 37. This table does not include four small sources of Delmarva Power (Christiana Substations 1 and 2, Madison Street Substation, and West Substation). The NOx emissions from these four small sources were not included in Delaware's 1990 Base Year Emission Inventory because they were smaller than the 25 TPY threshold.
** A negative sign indicates an actual emission increase.
*** Plant names changes since 1990: (1) First State Power Point 001 was formerly Kraft General Foods Point 001. (2) Motiva Enterprises was formerly Star Enterprise. Motiva's Point 067 was formerly Delmarva Power's Point 001 at Delaware City.

2.4 Summary of VOC and NOx Emission Reductions after Amendments

As a result of the amendments in the foregoing subsections, VOC and NOx emission reductions in 1999 from the affected sources have changed, and thus the total VOC and NOx emission reductions for the entire nonattainment area (i.e., Kent and New Castle counties) have changed as well. A summary of these changes is presented in Table 1.

Table 1. Summary of 1999 VOC and NOx Emission Reductions (in TPD)

	VOC		NOx	
Control Measure/Source	Original*	Amended	Original*	Amended
Benzene Waste Rule & Delaware Reg. 24.28	1.743	1.722	-	-
Delaware NOx RACT in Kent County	-	-	1.051	0.018
OTC Regional Controls & Delaware Reg. 37	-	-	24.650	28.907
Nonattainment Area Total Reductions	49.553	49.532	36.856	40.080

* Data are obtained from Table 3-8, page 3-26, Delaware 1999 RPP (Ref. 3).

2.5 REQUIREMENTS FOR VOC AND NOx EMISSION REDUCTIONS

As required by the adequate rate-of-progress in emission reductions set forth in the CAAA, Delaware has determined that the required target level of total VOC emissions in its nonattainment areas (i.e., Kent and New Castle counties) in 1999 should be 101.814 tons per day (TPD) in the peak ozone season (page 1-24, 1999 RPP). In the 1999 RPP, Delaware has also shown that the 1999 control strategy projection for VOC emissions (or the actual target level) would be 110.185 TPD which is higher than the required target level (page 1-24, page 3-1, 1999 RPP). Thus, it is necessary for Delaware to use NOx emission reductions to substitute for VOC emission reductions. As explained in the 1999 RPP, Delaware meets all the conditions set forth by EPA for NOx substitution (Section 1.3, page 1-21, Section 1.4, page 1-25, 1999 RPP).

As determined in Part II of the 1999 RPP (Table 2-1, page 2-2), the 1999 current control projections of VOC emissions is 159.738 TPD. Delaware will use the total amended 49.532 TPD VOC emission reductions in its 1999 Rate-of-Progress Plan. As a result, the 1999 control strategy projection for VOC emissions shall be amended to be 110.206 TPD (i.e., 159.738 - 49.532 = 110.206 TPD). This amended control strategy projection shall serve as a new (or amended) 1999 VOC emission target level and replace the original target level of 110.185 TPD (page 1-29, 1999 RPP). Because of this amendment, the rate-of-progress requirements on VOC and NOx emission reductions in 1999 must be reassessed.

First, the creditable VOC emission reductions need to be recalculated. The calculation is shown in the amended Table 1-16, which shall replace the original Table 1-16, page 1-28 of the 1999 RPP, entitled "VOC Emissions Reductions Creditable for 3% per Year Rate of Progress Requirement for 1996-1999 Period in Tons per Peak Ozone Season Day".

Table 1-16 (Amended)
Calculation of Creditable VOC Emission Reductions (in TPD) for 1999 RPP

Description	VOC Emissions	
1996 VOC Emission Target Level*	115.815	(u)
VOC Fleet Turnover for 1996-1999 Period	1.910	(v)
1999 VOC Control Strategy Projection	110.206	(w)
Creditable VOC Emission Reduction	3.699	(x)=(u)-(v)-(w)

*The 1996 VOC emission target level is obtained from Delaware 15% Rate-of-Progress Plan (Reference 4).

Second, the percentage of NOx emission reductions required for substitution needs to be determined. As indicated in the 1999 RPP, the 1990 adjusted base year VOC emission level is 134.343 TPD (page 1-23, 1999 RPP). The percentage of the creditable VOC emission reductions in Table 1-16 (Amended) with respect to the 1990 adjusted base year emission is 2.75% (i.e., 3.699/134.343=0.0275=2.75%). The percentage of NOx emission reductions required for substitution can be determined from EPA's requirement, that is, the total percentage of VOC and NOx emission reductions must be at least equal to 9% for the 3-year period of 1996-1999. Thus, the required NOx emission reduction for substitution will be 9.00% - 2.75% = 6.25%. In other words, the total percentage of VOC reduction plus NOx reduction must be at least 9%, as shown in Table 1-17 (Amended), which shall replace the original Table 1-17, page 1-28, 1999 RPP, entitled "Percent of VOC and NOx Emissions Reductions Needed for 1996-1999 Period".

Table 1-17 (Amended)
Percents of VOC and NOx Emission Reductions for 1996-1999 Period

Milestone Period	VOC Reduction (%) (a)	NOx Reduction (%) (b)	Total Reduction (%) (c)=(a)+(b)
1996 - 1999	2.75	6.25	9.00

As indicated in Table 1-15 of the 1999 RPP, the total 1990 adjusted base year NOx emission is 158.895 TPD (page 1-27, 1999 RPP). By multiplying with the NOx substitution percentage in Table 1-17 (Amended), the NOx emission reductions in 1999 must be at least 158.895x6.25% = 9.931 TPD to meet the rate-of-progress requirements. As a result, the target level of NOx emissions in 1999 will be 158.895 - 9.931 = 148.964 TPD.

As determined in Part II of the 1999 RPP (Table 2-1, page 2-2), the 1999 current control projections of NOx emissions is 184.059 TPD. To meet the 1999 NOx emission target of 148.964 TPD, a NOx emission reduction of 35.095 TPD must be achieved (i.e., 184.095 - 148.964 = 35.095 TPD). Since the 1999 NOx emission reductions are expected to be 40.080 TPD, which is greater than the required 35.095 TPD, Delaware believes that the control measures proposed in the 1999 RPP, as amended by this document, are adequate for meeting the rate-of-progress requirements set forth by the CAAA. Delaware decides to use 35.095 TPD of the total expected 40.080 TPD (Table 1 in the previous subsection) in the main plan of the 1999 RPP, and use the remainder (i.e., 40.080 - 35.095 = 4.986 TPD) in the contingency plan of the 1999 RPP.

3. CONTINGENCY PLAN OF DELAWARE'S 1999 RPP

3.1 Contingency Requirements for Emission Reductions

The CAAA requires States with nonattainment areas to implement specific control measures if the area fails to make reasonable further progress, fails to meet any applicable milestone, or fails to attain the national ambient air quality standards by the applicable attainment date.[1] The EPA has interpreted this CAAA provision as a requirement for States with moderate and above ozone nonattainment areas to include sufficient contingency measures in their Rate-of-Progress Plans so that, upon implementation of such measures, additional emission reductions of at least 3% of the adjusted 1990 base year emissions would be achieved (Ref. 9). Under the same provision of the CAAA, EPA also requires that the contingency measures must be fully-adopted control measures or rules, so that, upon failure to meet milestone requirements or attain the standards, the contingency measures can be implemented without any further rulemaking activities by the States and/or EPA.

To meet the requirements for contingency emission reductions, EPA allows States to use NOx emission reductions to substitute for VOC emission reductions in their contingency plans. The condition set forth by EPA for NOx substitution is that States must achieve a minimum of 0.30% VOC reductions of the total 3% contingency reduction, and the remaining 2.70% reduction can be achieved through NOx emission controls (Ref. 10). Delaware decides to include both VOC and NOx emission controls in its contingency plan for the 1999 Rate-of-Progress Plan.

3.2 Control Measures to Meet Contingency Requirements

Delaware proposes to achieve the required contingency emission reductions through controls over both VOC and NOx emissions. The VOC emission reductions will be obtained from implementing an annual inspection schedule for the Stage II Vapor Recovery Systems, and the NOx emission reductions will be achieved through a combination of controls on various sources in the peak ozone season. The contingency measures and the associated VOC and NOx emission reductions are discussed in detail in the following subsections.

3.2.1 Stage II Vapor Recovery System with Annual Inspections

[1] CAAA, Title I, Part D, Section 172(c)(9) and Section182(c)(9).

The CAAA requires States with moderate and above ozone nonattainment areas to submit a SIP revision requiring owners or operators of gasoline dispensing facilities to install and operate a system for gasoline vapor recovery during refueling process for motor vehicles.[2] Under this requirement, Delaware has developed its Stage II Vapor Recovery Program, which is defined in Section 36 of Delaware Air Regulation 24 (Ref. 5). The Delaware's stage II vapor recovery regulation gives the regulatory agency the right to perform compliance inspections as needed. Currently, a triennial inspection schedule is performed by the responsible agency (Underground Storage Tank Branch of DNREC). Delaware has taken credit for VOC emission reductions from this triennial inspection schedule in Part III of the 1999 RPP, where the emission reductions are estimated using a control efficiency (CE) of 95%, a rule penetration (RP) of 97%, and a rule effectiveness (RE) of 65.3% according to an EPA guidance document (page 3-69, 1999 RPP). The total creditable VOC emission reduction from the triennial inspection is 1.780 TPD, as indicated in Part III of the 1999 RPP (page 3-72).

Additional VOC emission reductions can be obtained from the Stage II Vapor Recovery Program when the inspection frequency is increased. If the program is conducted with an annual inspection schedule, the rule effectiveness (RE) value of this control will increase from 65.3% to 90.5%, resulting in additional VOC emission reductions. In other words, the program is more effective for reducing VOC emissions with a higher inspection frequency. Delaware proposes to perform an annual inspection schedule for its Stage II Vapor Recovery Program as a contingency measure. Based on a 95% control efficiency, a 97% rule penetration, and a 90.5% rule effectiveness, the emission factor generated from MOBILE5a is 0.92 grams of VOC per gallon of gasoline for both Kent and New Castle Counties. The MOBILE5a input and output files determining the 1999 stage II annual inspection emission factors for Kent and New Castle Counties are provided in Appendix P.

As per EPA's guidance document *Procedures for Emissions Inventory Preparation, Volume IV: Mobile Sources* (Ref. 11), the in-use efficiency of stage II vapor recovery system applies to both spillage and displacement. Therefore, the effect of the vapor recovery program on spillage and displacement will be determined separately.

(a) Effect of Stage II Vapor Recovery with Annual Inspections on Spillage

As explained in Part III of the 1999 RPP (page 3-70), a baseline spillage factor of 0.31 g/gal has been used in the MOBILE5a modeling. The actual spillage factor can be estimated using the 95% control efficiency, 90.5% rule effectiveness, and 97% rule penetration, which gives

$$\textit{Spillage Factor} = 0.31 - (0.31 \times 95\% \times 90.5\% \times 97\%)$$
$$= 0.05 \text{ grams VOC/gallon gasoline}$$

[2] CAAA, Title I, Part D, Section 182(b)(3).

The 1999 Control Strategy Projection of VOC emissions from spillage can be determined using Equation A-3 as explained in the 1999 RPP (page 3-16). Using the 0.05 g/gal emission factor, the projected emissions are:

Kent County:

$ACTLEV$ = 183,131 gallons gasoline/day (1990 Baseline Inventory Throughput)

EMF_{py} = 0.05 grams VOC/gallon gasoline

GF_{py} = 0.89

Conversion Factor = $0.0022\, lb / gram \times \frac{ton}{2000\, lb}$

$$EMIS_{py} = 183{,}131 \times 0.05 \times 0.89 \times \frac{0.0022}{2000} = 0.009\, TPD$$

New Castle County

$ACTLEV$ = 587,283 gallons gasoline/day (1990 Baseline Inventory Throughput)

EMF_{py} = 0.05 grams VOC/gallon gasoline

GF_{py} = 0.89

Conversion Factor = $0.0022\, lb / gram \times \frac{ton}{2000\, lb}$

$$EMIS_{py} = 587{,}283 \times 0.05 \times 0.89 \times \frac{0.0022}{2000} = 0.029\, TPD$$

The additional VOC emission reductions for spillage by switching a triennial inspection schedule to an annual inspection schedule are the differences between the projected emissions for the triennial program and the annual program. The additional reductions are:

Kent County

Projection with triennial inspection (page 3-70, 1999 RPP) = 0.022 TPD;
Projection with annual inspection (calculated above) = 0.009 TPD;
Additional Emission Reduction = 0.022 - 0.009 = 0.013 TPD.

New Castle County

Projection with triennial inspection (page 3-70, 1999 RPP) = 0.069 TPD;
Projection with annual inspection (calculated above) = 0.029 TPD;
Additional Emission Reduction = 0.069 - 0.029 = 0.040 TPD.

Additional VOC Emission Reduction for Spillage:

ER_{spill} = 0.013 + 0.040 = 0.053 TPD in the peak ozone season.

(b) Effect of Stage II Vapor Recovery with Annual Inspections on Displacement

As explained in Part III of the 1999 RPP (page 3-70), the emission factor of 0.92 g/gal from MOBILE5a accounts for emissions from both displacement and spillage. Thus, the emission factor for displacement can be determined by subtracting 0.05 g/gal (determined earlier) from 0.92 g/gal, which gives

Displacement Factor = 0.92 – 0.05 = 0.87 grams VOC/gallon gasoline

The 1999 Control Strategy Projection emissions from displacement can be determined using Equation A-3 as explained in the 1999 RPP (page 3-16). Using the 0.87 g/gal emission factor, the projected emissions are:

<u>Kent County</u>

$ACTLEV$ = 183,131 gallons gasoline/day (1990 Baseline Inventory Throughput)

EMF_{py} = 0.87 grams VOC/gallon gasoline

GF_{py} = 0.89

Conversion Factor = $0.0022\, lb / gram \times \frac{ton}{2000\, lb}$

$$EMIS_{py} = 183{,}131 \times 0.87 \times 0.89 \times \frac{0.0022}{2000} = 0.156\, TPD$$

<u>New Castle County</u>

$ACTLEV$ = 587,283 gallons gasoline/day (1990 Baseline Inventory Throughput)

EMF_{py} = 0.87 grams VOC/gallon gasoline

GF_{py} = 0.90

Conversion Factor = $0.0022\, lb / gram \times \frac{ton}{2000\, lb}$

$$EMIS_{py} = 587{,}283 \times 0.87 \times 0.89 \times \frac{0.0022}{2000} = 0.500\, TPD$$

The additional VOC emission reductions for displacement by switching a triennial inspection schedule to an annual inspection schedule are the differences between the projected emissions for the triennial program and the annual program. The additional reductions are:

<u>Kent County</u>

Projection with triennial inspection (page 3-71, 1999 RPP) = 0.294 TPD;

Projection with annual inspection (calculated above) = 0.156 TPD;
Addition VOC Emission Reduction = 0.294 - 0.156 = 0.138 TPD.

New Castle County

Projection with triennial inspection (page 3-72, 1999 RPP) = 0.943 TPD;
Projection with annual inspection (calculated above) = 0.500 TPD;
Additional VOC Emission Reduction = 0.943 - 0.500 = 0.443 TPD.

Additional VOC Emissions Reduction for Displacement:

$$\boldsymbol{ER_{\text{displace}} = 0.138 + 0.443 = 0.581 \text{ TPD in the peak ozone season.}}$$

The total additional VOC emission reduction from Stage II Vapor Recovery Program with an annual inspection schedule is the sum of the additional reductions for spillage and displacement, that is,

$$\boldsymbol{ER_{\text{total}} = 0.053 + 0.581 = 0.634 \text{ TPD in the peak ozone season.}}$$

In its 1999 Rate-of-Progress Plan, Delaware has determined its 1990 adjusted base year inventory level of VOC emissions to be 134.343 TPD (page 1-23, 1999 RPP). The additional 0.634 TPD VOC emission reduction estimated above is (0.634/134.343) = 0.0047 = 0.47% of the 1990 adjusted base year VOC emissions, thus, satisfying the 0.30% minimum requirement on VOC emission reductions for the contingency plan. The rest of the contingency reductions will be obtained through NOx controls, which will be discussed in the following subsection.

3.2.2 NOx Emission Controls in Peak Ozone Season

As determined above, 0.47% of the 3.00% contingency requirement will be obtained by VOC emission reductions from annual inspection of Stage II vapor recovery systems. The remaining 2.53% (i.e., 3.00% - 0.47% = 2.53%) is the percentage required for NOx reduction substitution. The adjusted 1990 base year NOx emission level has been determined to be 158.895 TPD in the 1999 RPP (page 1-27, 1999 RPP). Thus, the NOx emission reductions for contingency purpose will be at least 158.895 x 2.53% = 4.020 TPD.

In Subsection 2.5 of this document, Delaware has demonstrated that, through adequate NOx emission controls, a 4.985 TPD NOx emission reduction will be achieved, in addition to those needed to meet the minimum rate-of-progress requirements for the 1999 RPP. Delaware shall use this additional 4.985 TPD NOx emission reduction in the contingency plan based on the following judgements. First, this additional reduction satisfies the required minimum amount of NOx reduction substitution for contingency purpose, i.e., 4.020 TPD as determined above. Second, this additional reduction is achieved from a combination of control measures included in

Delaware's 1999 RPP as amended by this document. All these control measures are fully-adopted measures or rules. Thus, no further rulemaking actions by the State and/or EPA are needed when all or part of the 4.985 TPD NOx reduction becomes necessary to serve the contingency purpose. Third, unused part of the 4.985 TPD can be transferred to backfill shortfalls in the contingency plan and/or the overall control strategy in Delaware's 2002 and/or 2005 rate-of-progress plans without further rulemaking actions.

3.2.3 Summary of Contingency Measures and Emission Reductions

A summary of the contingency measures and the associated additional VOC and NOx emission reductions are presented in Table 2. As shown in Table 2 and in the discussions above, the contingency measures proposed in this plan are adequate for meeting the contingency requirements set forth by EPA.

Table 2. Summary of Contingency Measures and Emission Reductions

	Emission Reduction (TPD)	
Contingency Measures	**VOC**	**NOx**
Stage II Vapor Rec. with Annual Inspection	0.634	-
Required VOC Emission Reductions	0.634	-
NOx Controls in Peak Ozone Season	-	4.986
Minimum NOx Emission Reductions	-	4.020

APPENDIX M
(Amended)

VOC EMISSION REDUCTIONS
FROM THE FEDERAL BENZENE WASTE RULE
AND DELAWARE AIR REGULATION 24.28
AT
WASTEWATER TREATMENT PLANT OF
MOTIVA ENTERPRISES

(Note: This amended Appendix M shall replace the original version in Delaware's 1999 RPP dated December 1997)

1. Background

In order to comply with the Federal Benzene Waste Rule and Section 28 of Delaware Air Pollution Control Regulation 24 (hereafter referred to as Regulation 24.28), Motiva Enterprises (formerly Star Enterprise) in New Castle County planned to implement a number of process modifications and emission controls to its waste water treatment plant prior to 1996. These modifications and controls include:

(1) Oily Water Sewer: Using passive ventilation through carbon canisters for active manholes and sealing inactive manholes.
(2) CPI Separator: Sealing the existing fixed roof, adding a nitrogen blanket, and passively venting emissions to a carbon absorption canister.
(3) API Separator: Using a combination of fixed and floating covers and venting emissions to a carbon absorption canister.
(4) Equalization Tanks: Covering with floating roofs.
(5) Spill Diversion Tank: Covering with a floating roof.
(6) Dissolved Air Flotation Unit: Retrofitting with fixed roof covers and venting emissions to a control device.

In the 1990 Base Year Inventory, VOC emissions from the oily water sewer manholes, the CPI and API separators, the equalization tanks, the spill diversion tanks, and the dissolved air floatation unit were reported as a whole with one value of 2.3130 TPD in the per peak ozone season. In order to project future emissions from the treatment system, a breakdown of the 1990 emissions for individual units with modifications and/or new controls has been developed from information provided by Motiva Enterprises via a letter from Motiva's Plant Manager, R.G. Soehlke, to R. Taggart, Program Manager, Engineering and Compliance Section of DNREC, dated on March 6, 1992 (Attachment 1). A summary of the breakdown of 1990 base year emissions from Motiva's wastewater treatment system is presented in Table M-1.

Table M-1
1990 Base Year Uncontrolled VOC Emissions from Motiva's Wastewater Treatment Plant

Unit Description	1990 Base Year Emissions*		
	VOC (TPY)	VOC (TPD)	Non-Benzene VOC (TPY)
Oily Water Sewer	6.2	0.017	5.0
CPI Separator	7.3	0.020	5.8
API Separator	563.0	1.542	562.5
Equalization Tanks	115.9	0.318	114.5
Spill Diversion Tank	75.0	0.205	75.0
Dissolved Air Floatation	81.0	0.222	80.0
Total	848.4	2.324	842.8

*Notes: (1) VOC emissions from oily water sewer was omitted in 1990 Base Year Inventory due to its small emission rate. (2) Total VOC emission in 1990 Base Year Inventory is 2.313 TPD. The small discrepancy herein resulted from rounding error and including the oily water sewer.

2. VOC Emission Reductions from Individual Units

Motiva Enterprises has provided information about the effect of the planned modifications and controls on VOC emissions for each unit. Such information has been used to project VOC emissions from the wastewater treatment system in the future milestone years. Details of VOC emission projections in 1999 are discussed in this section.

(1) Oily Water Sewer

Per the Benzene Waste Rule, hydrocarbon removal with carbon canisters must be 95 percent effective. Therefore, VOC emissions after modifications to the oily water sewer can be estimated using the 1990 emission in Table M-1 and a 95% control efficiency, which gives

$$(0.017 \text{ TPD}) \times (1-95\%) = 0.001 \text{ TPD}$$

(2) CPI Separator

Per the Benzene Waste Rule, hydrocarbon removal with carbon canisters must be 95 percent effective. Therefore, VOC emissions after modifications to the CPI Separator can be estimated using the 1990 emission in Table M-1 and a 95% control efficiency as follows

$$(0.20 \text{ TPD}) \times (1-95\%) = 0.001 \text{ TPD}$$

(3) API Separator

The emissions from the API Separator will be controlled by both covering the unit and venting emissions to a carbon absorption canister. Motiva has estimated the amount of VOC emissions that will be vented to the carbon absorption canister from the covered API Separator by using AP-42 methodology for determining breathing losses from the fixed-roof tanks. This emission rate is 61.7 TPY which is equal to a daily rate of 0.169 TPD. These emissions will be sent to a carbon absorption canister, which must have a control efficiency of 95% per the Benzene Waste Rule. Therefore, the emissions to the atmosphere after the installation of controls on the API Separator can be determined as

$$(0.169 \text{ TPD}) \times (1.00 - 95\%) = 0.008 \text{ TPD}$$

Therefore, the amount of VOC that is captured by the carbon absorption canister is

$$0.169 \text{ TPD} - 0.008 \text{ TPD} = 0.161 \text{ TPD}$$

The reduction in VOC emissions from the API Separator is due not only to the carbon absorption device, but also to the fact that the covers on the API Separator keep more volatile organic

compounds in the liquid phase rather than vaporizing to the atmosphere. Therefore, a higher volume of VOCs in the liquid phase will go to downstream units in the wastewater treatment plant. Because they may eventually be emitted to the atmosphere from a downstream unit, these VOCs must be accounted for when determining overall emissions from the wastewater treatment plant. The additional amount of VOCs in the liquid phase that will go to the downstream units is determined as follows.

First, the decrease in VOC emissions due to the new controls is determined by subtracting the controlled emissions from the uncontrolled emissions. The controlled emissions have been previously calculated to be 0.008 TPD. The uncontrolled emissions are 1.542 TPD (Table M-1). Therefore, the total decrease in VOC emissions is

$$(1.542\ \text{TPD})_{\text{uncontrolled}} - (0.008\ \text{TPD})_{\text{controlled}} = 1.534\ \text{TPD}$$

The vapor portion of the 1.534 TPD decrease is the amount of VOC that will be removed by the carbon absorption canister. This amount has been previously calculated to be 0.161 TPD. The portion of the total VOC reduction that remains in the liquid phase is the difference between the total VOC reduction and the vapor portion that is removed by the carbon absorption canister, which is

$$1.534\ \text{TPD} - 0.161\ \text{TPD} = 1.373\ \text{TPD remaining in liquid phase}$$

According to Motiva Enterprises, 55 percent of the 1.373 TPD, or 0.755 TPD, will be removed in the API Separator and will go to the Coker. Therefore, the amount of VOCs that will remain in the liquid phase and go to downstream units is

$$1.373\ \text{TPD} - 0.755\ \text{TPD} = 0.618\ \text{TPD}$$

(4) Equalization Tanks

Based on AP-42 methodology, the emissions from the equalization tanks after installation of floating roofs will essentially be zero. Therefore, the decrease in VOC emissions from these tanks is equal to the 0.318 TPD as listed in Table M-1. The floating roofs on the equalization tanks will cause an increase in liquid VOCs to downstream units similar to the increase caused by the API Separator covers. The amount of VOCs from the equalization tanks that will remain in the liquid phase is equal to the emission reduction of 0.318 TPD. Therefore, the net increase in VOCs to downstream units is the sum of the 0.618 TPD liquid VOCs previously calculated from the API Separator covers and the 0.318 TPD liquid VOCs resulting from the floating roofs on the equalization tanks. Thus, the total increase is 0.618 + 0.318 = 0.936 TPD liquid phase VOCs that will go to the Dissolved Air Floatation Unit.

(5) Spill Diversion Tank

The VOC emissions from the spill diversion tank will essentially be zero after installation of the floating roof. The uncontrolled VOC emissions of 75 TPY (or 0.205 TPD) from the spill diversion tank

(Table M-1) are the result of maintaining an oil layer on the top of the tank to control odor. This practice will no longer be necessary after installation of the floating roof, thus, the VOC emissions of 0.205 TPD from the spill diversion tank will be totally eliminated from the process. Consequently, there will be no increase in VOC loading on any downstream units from the Spill Diversion Tank.

A portion of the emission reduction from the spill diversion tank will be used to offset VOC emissions from a new Ether Project at Motiva Enterprises facility. This portion of the emission reduction is not creditable for meeting the Rate-of-Progress requirements. The Ether Project is expected to produce a VOC emission of 66.5 TPY, which is equal to a daily emission of 0.182 TPD. A 1:1 offset of the 0.182 TPD is needed from the VOC reduction at the spill diversion tank. Therefore, a controlled emission of 0.182 TPD is attributed to the spill diversion tank. In this manner, the amount of emission reductions to be credited to the 1999 RPP from the spill diversion tank will exclude the amount of reduction needed to offset the Ether Project, which gives

$$\text{Creditable Reduction for 1999 RPP} = 0.205 - 0.182 = 0.023 \text{ TPD}$$

(6) Dissolved Air Floatation (DAF) Unit

The VOC emissions from the DAF unit will be controlled by both covering the unit and venting emissions to a control device. Per the Benzene Waste Rule, the control device must have a 95% VOC removal efficiency. Based on design data, Motiva Enterprises have estimated the emissions that will be vented to the control device from the covered DAF unit to be 4.8 TPY, which is equal to a daily emission of 0.013 TPD. The emissions to the atmosphere from the control device are then determined to be

$$(0.013 \text{ TPD}) \times (1.00 - 95\%) = 0.001 \text{ TPD}$$

The amount of VOC that will be removed by the control device is

$$0.013 \text{ TPD} - 0.001 \text{ TPD} = 0.012 \text{ TPD}$$

The covers on the DAF unit will cause an increase in liquid phase VOCs to downstream units similar to the increase caused by the API Separator and the equalization tanks. Similarly, the decrease in VOC emissions due to the new controls is determined by subtracting the controlled emissions from the uncontrolled emissions. The controlled emissions have been previously estimated to be 0.001 TPD, while the uncontrolled emissions are 0.222 TPD, as listed in Table M-1. Therefore, the total decrease in VOC emissions from the DAF unit is

$$0.222 \text{ TPD} - 0.001 \text{ TPD} = 0.221 \text{ TPD}$$

The vapor portion of the 0.221 TPD reduction is the amount of VOC that is removed by the control device. This amount has been previously calculated to be 0.012 TPD. The portion of the total

VOC reduction that remains in the liquid phase is the difference between the total VOC reduction and the vapor portion, that is

$$0.221 \text{ TPD} - 0.012 \text{ TPD} = 0.209 \text{ TPD}$$

This amount is added to the previously calculated 0.936 TPD liquid phase VOCs, which comes to the DAF unit from the API Separators and the equalization tanks, resulting in a cumulative increase in liquid phase VOCs of 1.145 TPD. According to Motiva Enterprises, 80 percent of this 1.145 TPD, or 0.916 TPD, will be removed in the DAF unit and will go to the Coker. Therefore, the amount of liquid phase VOCs that will go to downstream units is

$$1.145 \text{ TPD} - 0.916 \text{ TPD} = 0.229 \text{ TPD}$$

Of the 0.229 TPD liquid phase VOCs going downstream from the DAF unit, Motiva Enterprises state that 50% will be bio-degraded in the first stage aeration unit. The remainder will be emitted to the atmosphere. Therefore, the net increase in VOC emissions to the atmosphere due to downstream loading from all units is

$$(0.229 \text{ TPD}) \times (0.50) = 0.115 \text{ TPD to the atmosphere}$$

A summary of VOC emissions from individual units at Motiva's wastewater treatment plant after implementing the planned modifications and controls is presented in Table M-2.

Table M-2
Summary of VOC Emissions at Motiva's Wastewater Treatment Plant

Source Unit	Controlled VOC Emissions (TPD)
Oily Water Sewer	0.001
CPI Separator	0.001
API Separator	0.008
Equalization Tanks	0.000
Spill Diversion Tank	0.182*
Dissolved Air Floatation Unit	0.001
Downstream Loading	0.115
Total Emission	0.308

*For offsetting VOC emissions from the ether project.

3. 1999 Control Strategy Projections and Emission Reductions

The 1999 Control Strategy Projection for the Motiva Enterprises wastewater treatment plant can be calculated using an overall control efficiency which accounts for VOC emission reductions from all process modifications and controls at the treatment plant. This 1999 Overall Control Efficiency (CE_{1999}) can be determined using the 1990 uncontrolled emissions from Table M-1 and the estimated controlled emissions from Table M-2, which gives

$$CE_{1999} = \frac{2.324 - 0.308}{2.324} \times 100\% = 86.8\%$$

The VOC emissions from Motiva's wastewater treatment plant are projected to 1999 using projection Equation P-3 as presented in the 1999 RPP (page 3-10). The parameters needed for the projection are

1990 Actual Emissions	= 2.324 TPD (From Table M-1)
1999 Overall Control Efficiency	= 86.8% = 0.868 (Calculated above)
1999 Rule Effectiveness	= 80% = 0.80 (Default value)
1990 Control Efficiency	= 0% = 0 (No controls in 1990)
1990 Rule Effectiveness	= 100% = 0 (No rule effect in 1990)
1999 Growth Factor	= 1.08 (Page 2-9, 1999 RPP)

The 1999 control strategy projection of VOC emissions is

$$EMIS_{1999} = 2.324(TPD) \times \frac{1 - 86.8\% \times 80\%}{1 - 0\% \times 100\%} \times 1.08 = 0.767\,TPD$$

The VOC emission reduction at Motiva's wastewater treatment plant due to process modifications and new controls is the difference between the 1999 Current Control Projection emissions and the 1999 Control Strategy Projection emissions. The 1999 Current Control Projection emissions can be obtained using Equation P-6 (page 3-12, 1999 RPP), that is, multiplying the 1990 Base Year Emissions with the 1999 growth factor

$$EMIS_{1999\text{-Current Control}} = 2.324 \times 1.08 = 2.510 \text{ TPD}$$

Therefore, the VOC emission reduction in 1999 (ER_{1999}) from Motiva's wastewater treatment plant is expected to be

$$ER_{1999} = 2.510 \text{ TPD} - 0.767 \text{ TPD} = 1.743 \text{ TPD}$$

4. Emission Reduction Credit for 1999 Rate-of-Progress Plan

The VOC emission reductions at Motiva's wastewater treatment plant resulted from process modifications and controls planned by Motiva to comply with either the Federal Benzene Waste Rule or Delaware Air Regulation 24.28 for petroleum refinery. In July 1992, DNREC acknowledged the total VOC emission reduction of 75 TPY from the spill diversion tank to offset VOC emissions from Motiva's then-planned ether project (DNREC Secretary's Order No. 92-0044, July 14, 1992). Since Motiva estimated that the ether project would lead to a VOC emission increase of 66.5 TPY, a portion of the acknowledged VOC emission reduction, that is, 75 - 66.5 = 8.5 TPY, is included in the total

emission reductions estimated in Section 3. Delaware decides (1) not to use this 8.5 TPY acknowledged reduction in its 1999 RPP for reduction credit, and (2) to exploit alternative reductions (e.g., NOx emission reductions) to fulfill the emission reduction requirements in the 1999 RPP. This decision reflects DNREC's consideration to follow the Final Order and Decision, issued by the Environmental Appeals Board, the State of Delaware, on November 20, 1998 (Attachment 2).

The 8.5 TPY VOC reduction is estimated with respect to the 1990 base year. It cannot be simply subtracted from the 1999 total VOC emission reductions projected previously in Section 3. Instead, similar steps used in Section 3 should be applied to the source that produces this reduction, namely, the spill diversion tank. Delaware makes the following analysis to determine the 1999 VOC emission reduction resulting from this 8.5 TPY.

The 1990 base year VOC emission from Motiva's wastewater treatment plant ($EMIS_{1990}$) can be expressed as

$$EMIS_{1990} = EMIS_{1990CRED} + EMIS_{1990NONCR} \qquad (1)$$

where $EMIS_{1990CRED}$ is the emissions from which reduction credits will be taken in 1999, and $EMIS_{1990NONCR}$ is the emissions from which the reductions will not be taken as credit in 1999. The 1999 current control projection is

$$EMIS_{CC1999} = EMIS_{1990} \times GF = EMIS_{1990CRED} \times GF + EMIS_{1990NONCR} \times GF \qquad (2)$$

where GF is the growth factor. The first part of Eq. 2 is the credit portion and the second part is the non-credit portion. The 1999 control strategy projection is

$$\begin{aligned} EMIS_{CS1999} \quad &= EMIS_{1990CRED} \times GF \times (1 - CE_{CRED}\% \times RE\%) + \\ &\quad EMIS_{1990NONCR} \times GF \times (1 - CE_{NONCR}\% \times RE\%) \qquad (3) \end{aligned}$$

where $CE_{CRED}\%$ is the control efficiency of the credited sources and $CE_{NONCR}\%$ is the control efficiency for the non-credited sources. Again, the first part of Eq. 3 is the credit portion and the second part is the non-credit portion. The emission reduction in 1999 (ER_{1999}) is

$$\begin{aligned} ER_{1999} \quad &= EMIS_{CC1999} - EMIS_{CS1999} = ER_{1999CRED} + ER_{1999NONCR} \\ &= EMIS_{1990CRED} \times GF - EMIS_{1990CRED} \times \mathrm{GF} \times (1 - CE_{CRED}\% \times RE\%) + \\ &\quad EMIS_{1990NONCR} \times GF - EMIS_{1990NONCR} \times \mathrm{GF} \times (1 - CE_{NONCR}\% \times RE\%) \qquad (4) \end{aligned}$$

The emission reduction from the credit sources is

$$\begin{aligned} ER_{1999CRED} &= EMIS_{CC1999CRED} - EMIS_{CS1999CRED} \\ &= EMIS_{1990CRED} \times GF - EMIS_{1990CRED} \times GF \times (1 - CE_{CRED}\% \times RE\%) \qquad (5) \end{aligned}$$

The emission reduction from the non-credit sources is

$$ER_{1999NONCR} = EMIS_{CC1999NONCR} - EMIS_{CS1999NONCR}$$
$$= EMIS_{1990NONCR} \times GF - EMIS_{1990NONCR} \times GF \times (1 - CE_{NONCR}\% \times RE\%) \qquad (6)$$

For credit sources, the total 1990 emission can be obtained from Table M-1 minus 8.5 TPY, that is, 848.4 - 8.5 = 839.9 TPY, or 2.301 TPD. The controlled emission from these sources has been calculated previously in Table M-2. Thus, the control efficiency for the credit sources is

$$CE_{1999CRED} = \frac{2.301 - 0.308}{2.301} \times 100\% = 86.6\% \qquad (7)$$

Applying Eq. 5 and assuming an 80% rule effectiveness, the emission reduction credit can be calculated as

$$ER_{1999CRED} = EMIS_{CC1999CRED} - EMIS_{CS1999CRED}$$
$$= 2.301 \times 1.08 - 2.301 \times 1.08 \times (1 - 86.6\% \times 80\%)$$
$$= 2.485 - 0.763 = 1.722\ TPD$$

For the non-credit source, the 1990 emission is 8.5 TPY, or 0.023 TPD. The controlled emission for this source is 0.000 TPD (emission from the spill diversion tank after installation of floating roof). Thus, the control efficiency for the non-credit source is

$$CE_{1999NONCR} = \frac{0.023 - 0.00}{0.023} \times 100\% = 100\% \qquad (8)$$

Applying Eq. 6 and assuming an 80% rule effectiveness, the emission reduction from the non-credit source can be calculated as

$$ER_{1999NONCR} = 0.023 \times 1.08 - 0.023 \times 1.08 \times (1 - 100\% \times 80\%) = 0.020\ TPD$$

As mentioned previously, Delaware decides not to take this reduction as credit in its 1999 RPP. Therefore, the emission reduction credit for Delaware's 1999 RPP is only 1.722 TPD as calculated above.

Attachment 1 to Appendix M (Amended)

(A hardcopy of this attachment is available upon request. The request should be addressed to: Alfred Deramo, Program Manager, ERPA Program, DNREC, 156 S. State St., Dover, DE 19901. Telephone 302-739-4791, fax 302-739-3106.)

Letter from Motiva's Plant Manager, R.G. Soehlke, to R. Taggart, Program Manager, Engineering and Compliance Section of DNREC, dated on March 6, 1992, and the documentation attached to this letter, entitled "Summary of VOC Emission Effect Resulting from Compliance with the Benzene Waste Rule on the Waste Water Treatment Plant".

Attachment 2 to Appendix M (Amended)

(A hardcopy of this attachment is available upon request. The request should be addressed to: Alfred Deramo, Program Manager, ERPA Program, DNREC, 156 S. State St., Dover, DE 19901. Telephone 302-739-4791, fax 302-739-3106.)

Final Order and Decision, the Environmental Appeals Board, the State of Delaware, November 20, 1998.

APPENDIX P

MOBILE 5A INPUT AND OUTPUT FILES FOR STAGE II VAPOR RECOVERY PROGRAM WITH ANNUAL INSPECTIONS

(A hardcopy of this appendix is available upon request. The request should be addressed to: Alfred Deramo, Program Manager, ERPA Program, DNREC, 156 S. State St., Dover, DE 19901. Telephone 302-739-4791, fax 302-739-3106.)