City of Philadelphia
Department of Public Health
Air Management Services (AMS)
Reasonably Available Control Technology (RACT)
State Implementation Plan (SIP) Revision
under the 1997 8-Hour Ozone
National Ambient Air Quality Standards (NAAQS)

Table of Contents

Statutory Authority: page 4

Background: page 4

SIP Revision: page 5

Technical Analysis Memos

- Philadelphia Energy Solutions Refining and Marketing LLC (including Tank Farm) (3144 Passyunk Ave): page 17
- Honeywell International (Formerly Sunoco Chemical) – Frankford Plant (4700 Bermuda Street); page 35
- Paperworks Industries (5000 Flat Rock Road): page 46
- Sun Chemical (3301 Hunting Park Avenue): page 57
- Newman and Company, Inc. (6101 Tacony Street) : page 68
- Exelon (formerly PECO) – Southwark Station (2501 S. Delaware Avenue) : page 75
- Naval Surface Warfare Center Cardrock Division (formerly NAVSSES) (5001 South Broad Street) : page 76
- Temple – Health Sciences (3401 N. Broad Street): page 78
- Sunoco Partners Marketing & Terminals L.P - Belmont Terminal (2700 Passyunk Avenue) : page 91
- Aker Philadelphia Shipyard, Inc. (2100 Kitty Hawk Avenue) : page 93
- Inolex Chemical Company (Swanson & Jackson Streets) : page 95
- Allied Tube & Conduit Corporation (11350 Norcom Road) : page 97
- Cardone Industries (5660 Rising Sun Avenue) : page 99
- MIPC LLC - Philadelphia Terminal (formerly ConocoPhillips) (G Street & Hunting Park Avenue): page 103
- University of Pennsylvania (3451 Walnut Street) : page 105
- Philadelphia Prison System (8001 State Road) : page 109
- Kinder Morgan: page 112
- Philadelphia Gas Works - Richmond (3100 East Venango St) : page 130
- Plains Products Terminal LLC (3400 South 67th Street) : page 134
- Navy Foundry and Propeller Center (Navy Yard, Building 592) : page 138
- Grays Ferry Cogeneration Partnership (2600 Christian Street): page 141
- Temple University – Main Campus (Broad Street and Montgomery Avenue): page 149
- Veolia-Energy Efficiency (PA) LLC (2600 Christian Street): page 161

RACT Plan Approvals

- Honeywell, formerly Sunoco Chemicals (4700 Bermuda Street) : page 169
- Kinder Morgan, previously GATX (3300 North Delaware Avenue) : page 174
- PaperWorks, formerly Jefferson Smurfit (5000 Flat Rock Road) : page 178
- Temple – Health Sciences (3401 North Broad Street) : page 182
- PES Refinery, formerly Sunoco Refinery (3144 Paasyunk Avenue): page 186
- Philadelphia Gas Works – Richmond (3100 East Venango Street) : page 194
- Cardone Industries (5660 Rising Sun Avenue) : page 199
- Veolia Energy Philadelphia – Edison Station, formerly Trigen – Edison (908 Sansom Street) : page 202
- Veolia Energy – Schuykill Station, formerly Trigen – Schuylkill (2600 Christian Street): page 205
- Temple University – Main Campus (Broad Street and Montgomery Avenue): page 208
- Grays Ferry Cogeneration Partnership (2600 Christian Street): page 211
- Veolia Energy Efficiency (2600 Christian Street): page 214

Documentation of Public Hearing and Certifications

- Public Hearing Notice: page 217

Reasonably Available Control Technology (RACT) State Implementation Plan (SIP)
Revision for the 1997 8-hour Ozone National Ambient Air Quality Standard (NAAQS)

Statutory Authority:

25 Pennsylvania Code Subpart C Article III
Philadelphia Air Management Code 3-301 of the Philadelphia Code

Background:

The federal Clean Air Act (CAA) of 1990 gives states primary responsibility for achieving the National Ambient Air Quality Standards (NAAQS). The NAAQSs are established by the U.S. Environmental Protection Agency (EPA) as the maximum concentrations in the atmosphere for specific air contaminants to protect public health and welfare. The principal mechanism at the state and local level for complying with the CAA is the State Implementation Plan (SIP). A SIP outlines the programs, actions, and commitments a state will carry out to implement its responsibilities under the CAA. Once approved by the EPA, a SIP is a legally binding document under both state and federal law.

In June 2004, EPA designated 126 areas of the country as “non-attainment” under the 1997 8-hour ozone NAAQS. Among those non-attainment areas is the Philadelphia-Wilmington-Atlantic City Moderate Non-Attainment Area (NAA) that includes three counties in Delaware, five counties in eastern Pennsylvania, and eight counties in southern New Jersey.

On November 29, 2005, EPA published an ozone implementation rule to address nonattainment SIP requirements for the 1997 8-hour ozone NAAQS (the Phase 2 Ozone Implementation Rule; 70 FR 71612). In the Phase 2 Ozone Implementation Rule, EPA required that states meet the RACT requirements under the 1997 8-hour ozone NAAQS, either through a certification that previously adopted RACT controls in their SIP approved by EPA under the 1-hour ozone NAAQS continue to represent adequate RACT control levels for 8-hour ozone attainment purposes, or through the adoption of new or more stringent regulations that represent RACT control levels (70 FR 71655).

On September 29, 2006, PADEP submitted on behalf of AMS a SIP revision for Philadelphia County to meet the RACT requirements for the 1997 8-hour ozone NAAQS. The 2006 SIP revision consisted of a demonstration that Philadelphia County has met the RACT requirements for Nitrogen Oxides (NO_x) and Volatile Organic Compounds (VOC), and included: (1) A certification that previously adopted RACT controls in Pennsylvania's SIP that were approved by EPA for Philadelphia County under the 1-hour ozone NAAQS are based on the currently available technically and economically feasible controls, and continue to represent RACT for the 8-hour implementation purposes; (2) the adoption of federally enforceable permits that represent RACT control levels for four major VOC sources; and (3) a negative declaration that certain VOC sources do not exist in Philadelphia County.

In November 2008, several parties challenged EPA's Phase 2 Ozone Implementation Rule. In particular, EPA's determination that compliance with the NO_x SIP Call could satisfy NO_x RACT requirements for EGUs in nonattainment areas was challenged. As a result of this litigation, the Court decided that the provisions in the Phase 2 Ozone Implementation Rule providing that a state need not perform (or submit) a NO_x RACT analysis for EGU sources subject to a cap-and-trade program in accordance with the NO_x SIP Call were inconsistent with the statutory requirements of section 172(c)(1) of the CAA. In the 2006 SIP Revision, AMS certified as RACT, 25 PA Code Chapter 145 Subchapter A, which established a NOx budget and trading program for EGUs and other large sources to control transport emissions.

On June 22, 2010, PADEP submitted another SIP revision supplementing Philadelphia County's RACT demonstration under the 1997 8-hour ozone standard. The 2010 SIP revision consisted of: (1) The adoption of two regulations to meet control technique guidelines (CTG) RACT requirements, and (2) a negative declaration for a CTG source category.

On August 26, 2008 (73 FR 50270), EPA published a notice of proposed rulemaking (NPR) proposing approval of the 2006 SIP revision. On June 19, 2013 (78 FR 36716), EPA withdrew its August 26, 2008 proposed rule due to the Court decision regarding the Phase 2 Ozone Implementation Rule EPA determined it could not approve the presumption in the 2006 SIP submittal that the NO_x SIP Call constitutes RACT for EGU sources in Philadelphia County. In addition, EPA also determined that the 2006 SIP revision did not specifically and sufficiently address source-specific RACT controls for the 1997 8-hour ozone NAAQS required under 25 Pa Code 129.91-94. AMS had previously determined source-specific RACT controls for 46 major sources in Philadelphia County under the 1-hour ozone NAAQS, for which AMS needs to determine RACT under the 1997 8-hour ozone NAAQS.

On June 19, 2013, EPA also proposed conditionally approval of the Philadelphia County's RACT demonstration under the 1997 8-hour ozone NAAQS, as provided in the 2006 and the 2010 SIP revisions. The conditional approval was finalized on December 13, 2013 (78 FR 75902). The conditional approval was based upon PADEP's April 26, 2013 letter in which AMS committed to submit to EPA additional SIP revisions to address the deficiencies in the current RACT demonstration for Philadelphia County. The SIP revisions will provide source-specific RACT determinations for 10 major sources of VOC and NO_x in Philadelphia County, as listed in EPA's final notice, and a certification that previously adopted source-specific RACT controls approved by EPA in Pennsylvania's SIP for the 1-hour ozone NAAQS for the remaining sources in Philadelphia County continue to adequately represent RACT for the 1997 8-hour ozone NAAQS.

SIP Revision:

This SIP revision is intended to partially satisfy AMS' commitment by addressing source-specific RACT determinations for certain major sources of VOC and/or NOx; certifying that previously adopted source-specific RACT controls approved by EPA in the Pennsylvania's SIP under the 1-hour ozone NAAQS continue to adequately represent RACT for the 1997 8-hour ozone NAAQS; and certifying that certain sources that were applicable to the 1-hour ozone RACT are now minor sources or have shut down and are no longer applicable to the 1997 8-hour ozone RACT for the following facilities.

Table 1 provides a list of all major sources of NOx and/or VOC, emission sources subject to RACT, and the page number for the RACT technical memos. The technical memos address source-specific RACT determinations and/or provide certifications that the 1-hour ozone NAAQS continue to adequately represent RACT for the 1997 8-hour ozone NAAQS.

Table 2 provides a list of sources not applicable to the 1997 8-hour ozone RACT because they are now minor sources or shut down. AMS is certifying that the sources listed in Table 2 are no longer applicable to the 1997 8-hour ozone RACT.

This SIP revision also includes revisions to the approved RACT plan approvals for the following facilities: Honeywell, formerly Sunoco Chemicals (4700 Bermuda Street); Kinder Morgan, previously GATX (3300 North Delaware Avenue); PaperWorks, formerly Jefferson Smurfit (5000 Flat Rock Road); Temple – Health Sciences (3401 North Broad Street); PES Refinery, formerly Sunoco Refinery (3144 Paasyunk Avenue; Philadelphia Gas Works – Richmond (3100 East Venango Street); Cardone Industries (5660 Rising Sun Avenue).

This SIP revision also includes new RACT plan approvals which were not part of the 1-hour ozone RACT for the following facilities: Temple University – Main Campus (Broad Street and Montgomery Avenue); Grays Ferry Cogeneration Partnership (2600 Christian Street); Veolia Energy Efficiency (2600 Christian Street).

In addition, AMS is certifying in this SIP revision that 25 PA Code 129.81 which was originally approved as RACT for the 1-hour ozone standard continues to represent RACT for the 1997 8-hour ozone standard.

Table 1 List of Major Sources of NOx and/or VOC subject to RACT

Facility Name / Address	Major Source of		RACT Emission Sources	Technical Memo
	NO_x	VOC		
Philadelphia Energy Solutions Refining and Marketing LLC (including Tank Farm) (3144 Passyunk Ave)	X	X	• 27 refinery fuel gas-fired process heaters • 3 refinery fuel gas-fired boilers • Two(2) Fluid Catalytic Cracking Units (FCCUs) • Five (5) diesel-fired non-emergency reciprocating internal combustion engines (RICE) • Eleven (11) emergency generators and fire pumps • storage tanks • Eight (8) cooling towers • Two (2) loading operations • oil-water separators • degreasers vats <u>PES Tank Farm</u> • twenty one (21) internal floater storage tanks with capacities between 2.6-4.9 million gallons • two (2) open floater tanks, each with a capacity of 4.8144 million gallons • one (1) oil-water separator • one (1) propane loading rack with flare (60,000 lbs/hr) firing propane/butane • Fugitive emissions • two (2) diesel fire pumps (one 290 hp and the other 255 hp)	Page 17
Honeywell International (Formerly Sunoco Chemical) – Frankford Plant (4700 Bermuda Street)	X	X	• two (2) 260 MMBTU/hr, firing waste residue, gas or #6 fuel oil boilers • one (1) 381MMBTU/hr, firing gas or #6 fuel oil boiler •50 HP (below 20 MMBTU/hr), firing #2 fuel oil boiler • Oxidation Processes OX-501, OX-401, OX-301/302, OX-201/202 • twenty-five (25) Distillation Columns • seven (7) Reactors • Barge Loading •Tank Truck, Rail Car, and Drum Loading • forty (40) Storage tanks • Fugitive Emission Sources: pumps, valves, flanges, compressors, pressure relief valves, rupture disks • Rail Car Cleaning • Wastewater Facilities	Page 35
Paperworks Industries (formerly Jefferson Smurfit) (5000 Flat Rock Road)	X		• two (2) 92.27 MMBTU/hr boilers • one (1) 240 MMBTU/hr boiler	Page 46

Sun Chemical (3301 Hunting Park Avenue)		X	• The Manufacturing Group 140 – Conventional Blends include 25 mixers, 3 bench-top mixers, and 2 tanks. • The Manufacturing Group 140 – Rotor Stator Production include 5 mixers. • The Manufacturing Group 142 – Horizontal Mill Station include 2 mixers • The Manufacturing Group 141 – Ball Mill Production include 1 ball mill • The Manufacturing Group 143 – Kady Mill Production include 4 kady mills.	Page 57
Newman and Company, Inc. (6101 Tacony Street)	X		• 118 MMBTU/hr water tube boiler • twenty-nine (29) natural gas fired space heaters with less 500,000 BTU/hr heat capacity • two (2) natural gas fired power washers with less 500,000 BTU/hr heat capacity • one (1) 973,000 BTU/hr #2 oil burning fire pump.	Page 68
Exelon (formerly PECO) – Southwark Station (2501 S. Delaware Avenue)	X		• four 15.5 MW combustion turbines burning No.2 oil	Page 75
Naval Surface Warfare Center Cardrock Division (formerly NAVSSES) (5001 South Broad Street)	X		**Combustion units.** • Bldg 633 - 202 MMBTU/hr wall-fired ship's boiler • Twenty (20) new small boilers/heaters each less than 10 MMBTU/hr **Emergency Units** • B77H 268 bhp diesel fired Emergency Generator • B4 88 bhp natural gas fired Emergency Generator G1 • B4 154 bhp natural gas fired Emergency Generator G2 • B29 54 bhp natural gas fired Emergency Generator • B1000 186 bhp natural gas fired Emergency Generator • B485 208 hp diesel fired Fire Pump • B485 208 hp diesel fired Fire Pump • B542 115 hp diesel fired Fire Pump **Engines and Turbines** • B77H 16.42 MMBTU/hr Marine Engine Test Cell 1 • B77H 206.9 MMBTU/hr Engine Testing Gas Turbine DDG51 (LM-2500A) • B77H 206.9 MMBTU/hr Engine Testing Gas Turbine DDG51 (LM-2500B) • B77H 40.6 MMBTU/hr Engine Testing Gas Turbine CG-47 (K-17) • B77H 37.4 MMBTU/hr Engine Testing Gas Turbine GTG#2 (K-34) • B633 51.2 MMBTU/hr Engine Testing LSD-41 ALPHA • B633 51.2 MMBTU/hr Engine Testing LSD-41 Bravo • B633 ≤ 42.1 MMBTU/hr Engine Testing TF-40 Gas Turbine Test Cell 2 • B77H 37.4 MMBTU/hr Engine Testing Gas Turbine GTG#1 (K-34) • B77H 4.72 MMBTU/hr Engine Testing Gas Turbine Auxiliary (RIMMS) • B87 2.56 MMBTU/hr Engine Testing Diesel Generator	Page 76

			• B633 238 MMBTU/hr P-104 Test Cell • B77H 311.8 MMBTU/hr DD(X) MT-30 • B77H 51.4 MMTU/hr DD(X) LM-500 • B77H 55.6 MMTU/hr DD(X) RR-4500 • DDX Test Cell 418.8 MMTU/hr • B87 80 kW Caterpillar D80-4 Test Engine Generator • B77H 4.79 MMBTU/hr Diesel Engine Testing EDG, CAT C-18	
Temple University – Health Sciences Campus (3401 N. Broad Street)	X		•one (1) 76.4 MMBTU/hr boiler • two (2) <2 MMBTU/hr boilers •Twenty (20) emergency generators and fire pumps	Page 78
Sunoco Partners Marketing & Terminals L.P - Belmont Terminal (2700 Passyunk Avenue)		X	• Gasoline Truck Loading with Vapor Control Units products loading racks • Distillate Truck Loading • one (1) Emergency Generator • nine (9) Storage Tanks (with vapor pressure > 1.5 psia)	Page 91
Aker Philadelphia Shipyard, Inc. (2100 Kitty Hawk Avenue)		X	• Two (2) 12.6 MMBtu/Hr boilers burning natural gas; • Five (5) boilers each rated less than 2 MMBtu/Hr burning natural gas • Two (2) 4 MMBtu/Hr boilers burning natural gas • Painting operations	Page 93
Inolex Chemical Company (Swanson & Jackson Streets)	X		• One (1) 49 MMBtu/Hr. boiler • One (1) 20 MMBtu/hr. boiler • One (1) 6.5 MMBtu/Hr. boiler	Page 95
Allied Tube & Conduit Corporation (11350 Norcom Road)		X	• One (1) tube mill acid cleaning process • One (1) Mill 1 Area Space Heater with a capacity of 3.76 MMBtu/Hr • Four (4) Warehouse Space Heaters each with a capacity of 801,000 Btr/Hr.	Page 97
Cardone Industries (5660 Rising Sun Avenue)		X	**Surface Coating** • Electrostatic Disk Spray Booth • Manual Spray Booth Post Spray • Floor Type Spray Booth Pre-Spray • Touch-up Spray Booth • Touch-up Spray Booth • Manual Spray Booth • Manual Spray Booth • Manual Spray Booth **Cold-Cleaning Degreasers** • Vibrator Flowthru 55ft • Vibrator 6ft • Ultra Tub Vibrator 17 (5 ft)	Page 99

			• Ultra Tub Vibrator 3 (5ft) • Ultra Tub Vibrator (3ft) • Small Parts Tank (4sq ft) • Small Parts Tank (4sq ft) • Small Parts Tank (4sq ft) • Auger Tumbler Hurricane **Combustion Units** • Conveyorized Forced Air Drying Oven; 1.5 MMBTU/hr • Goff Hydropulse Washer; 0.5 MMBTU/hr • Goff Hydropulse Washer; 0.5 MMBTU/hr • Tally Washer; 0.3 MMBTU/hr • Washer, American Metal Wash; 0.3 MMBTU/hr • Parts Washer Beltwasher 2310; 0.8 MMBTU/hr • Water Heaters (2) Instant; 0.94 MMBTU/hr • Parts Washing Machine; 0.4 MMBTU/hr • Ransohoff tunnel washer: 1.9 MMBTU/hr • Goff Hydropulse HP-6 Washer; 0.3 MMBTU/hr • Goff Hydropulse HP-3SC (Autoline); 0.3 MMBTU/hr • Goff Hydropulse HP-63 Washer; 0.3 MMBTU/hr • Fulton Thermal Liquid Heater; 2.4 MMBTU/hr • Fulton Thermal Liquid Heater 2.4 MMBTU/hr • Propane Backup System Vaporizer; 0.84 MMBTU/hr • Hot Water Washing Machine (Kuhl); 4.65 MMBTU/hr • Hot Water Washing Machine (Ransohoff); 5.3 MMBTU/hr • HPI Belt Washer System #3; 0.44 MMBTU/hr • HPI Belt Washer 1610WR-SO; 0.44 MMBTU/hr • Detergent Belt Washer 0.8 MMBTU/hr • Steam Cleaner; 257,600 BTU/hr • Steam Cleaner; 257,600 BTU/hr • Lakeview water evaporator; 0.9 MMBTU/hr • Acid Dip tank with tumbler 0.4 MMBTU/hr • Backup Propane System Burner; 0.84 MMBTU/hr • Boiler Hot Water; 2.2 MMBTU/hr • Two (2) Hot Air Unit; 0.4 MMBTU/hr • Hot Air Unit; 0.8 MMBTU/hr • Two (2) Hot Air Unit; 2.2 MMBTU/hr • Eight (8) Carrier HVAC 48TJD020 Roof unit; 0.270 MMBTU/hr • Three (3) Carrier HVAC 48DKD028 Roof unit; 0.255 MMBTU/hr • Two (2) Cambridge HVAC C390 Roof unit; 0.4 MMBTU/hr	

			• Seven (7) Cambridge HVAC C600 Roof unit; 0.582 MMBTU/hr • Twenty-five (25) Cambridge HVAC C900 Roof unit; 0.9 MMBTU/hr • Three (3) Cambridge HVAC C1200 Roof unit; 1.2 MMBTU/hr • Cambridge HVAC M-136; 4.8 MMBTU/hr **Burnout Ovens** • Burnout Oven (8 bskt) w/ Integral Afterburner; 2 MMBTU/hr • Two (2) Burnout Oven (8 bskt) w/ Integral Afterburner; 3 MMBTU/hr • Six (6) Burnout Oven (12 bskt) w/ Integral Afterburner; 3 MMBTU/hr • Seghers Fluid Bed Oven B-3111/RAN; 0.93 MMBTU/hr • Burnout Oven w/ Integral Afterburner (Guspro 12 basket); 3 MMBTU/hr • Burnout Oven w/ Integral Afterburner (1 basket); 0.70 MMBTU/hr **Emergency Generator** Onan Backup Generator System – Diesel; 1.9 MMBTU/hr	
MIPC LLC - Philadelphia Terminal (formerly ConocoPhillips) (G Street & Hunting Park Avenue)		X	• One Truck Loading Rack with Vapor Recovery Unit and Transmix Loading Spot, • Five Light Petroleum Storage Tanks (#1303, #1322, #1311, #1312, & #1314), • Three Additive Storage Tanks (#1300, #1350, & #1351), • One Transmix Storage Tank (#1330), • Two Oil/Water Separators, and • Light Liquid/Vapor Components Fugitives.	Page 103
University of Pennsylvania (3451 Walnut Street)	X		• Nine (9) heaters and furnaces rated less than 10 MMBTU/hr each burn natural gas; • 15 emergency generators with capacities ranging between 75 kW - 750 kW that each burn natural gas; • 41 emergency generators with capacities ranging between 150 kW – 1,750 kW that each burn diesel; • Two (2) fire pumps with capacities ranging between 150 hp – 187 hp each burn diesel; • One (1) peak-shaving generator with a capacity of 2,000 kW and has Selective Catalytic Reduction (SCR) that burns diesel.	Page 105
Philadelphia Prison System (8001 State Road)	X		• 57 boilers rated less than 15 MMBtu/Hr burning No. 2 oil/ natural gas; • 10 emergency generators less than or equal to 2,200 hp burning diesel; • One (1) 365 hp chiller burning natural gas	Page 109
Kinder Morgan		X	• One (1) 490 hp emergency • Two (2) 85 hp air compressors • One (1) 13.4 MMBtu/Hr boiler • One (1) 6.7 MMBtu/Hr boiler • 112 storage tanks (81 storage tanks with capacities greater than or equal to 40,000 gallons, 31 storage tanks with capacities less than 40,000 gallons) • Marine vessel loading	Page 112

			• Tank truck/tank car loading • Fugitive emissions from process piping pumps, valves, & flanges • Tank cleaning and degassing operation • Soil vapor extraction system with CatOx • Sand blasting of tanks (listed as “insignificant sources” on Title V Operating Permit V95-044) • Painting of tanks (listed as “insignificant sources” on Title V Operating Permit V95-044) • Sump tank (listed as “insignificant sources” on Title V Operating Permit V95-044) • Catch basins (listed as “insignificant sources” on Title V Operating Permit V95-044) • Two oil water separator (Receives <200 gallons of organic materials per day, listed as “insignificant sources” on Title V Operating Permit V95-044) • Drumming operations (listed as “insignificant sources” on Title V Operating Permit V95-044) • Steam cleaning of equipment (listed as “insignificant sources” on Title V Operating Permit V95-044) • Chemical dryers (listed as “insignificant sources” on Title V Operating Permit V95-044) • Pipe cleaning (listed as “insignificant sources” on Title V Operating Permit V95-044) • Flushing of tanks with incoming products (listed as “insignificant sources” on Title V Operating Permit V95-044) • Fire equipment (listed as “insignificant sources” on Title V Operating Permit V95-044) • Mobile tanks (500 gallons each, listed as “insignificant sources” on Title V Operating Permit V95-044) • Tanks 1 (Emergency containment tank, listed as “insignificant sources” on Title V Operating Permit V95-044) • Tanks 2 and 3 (Emergency containment tank, listed as “insignificant sources” on Title V Operating Permit V95-044) • Tank no. 471 (#2 oil for the vapor incinerator, listed as “insignificant sources” on Title V Operating Permit V95-044) • Tank no. 420 (#2 oil for the boilers, listed as “insignificant sources” on Title V Operating Permit V95-044)	
Philadelphia Gas Works - Richmond (3100 East Venango St)	X		• six (6) Liquefied Natural Gas (LNG) vaporizer heaters between 94.1 and 105.0 MMBTU/hr •five (5) boiler/heaters of 11 MMBTU/hr or less • four (4) simple cycle combustion turbines of 13.7 MMBTU/hr or less(two Solar Gas Turbine compressor and two Solar gas turbine electric generators) • two (2) 170 HP emergency generators • three (3) 295 HP engines for fire pumps	Page 130
Plains Products Terminal LLC (3400 South 67th St)		X	• One (1) 20 MMBTU/hr thermal fluid heater; • One (1) 4.74 MMBtu/Hr boiler; • Six (6) 0.25 MMBTU/hr space heating units (listed as “insignificant sources” on Title V Operating Permit V10-025); • 13 petroleum/organic products storage tanks each with a capacity greater than or equal to 10,566 gallons;	Page 134

			• 7 petroleum/organic products storage tanks each with a capacity less than or equal to 40,000 gallons; • 23 storage tanks each with a capacity each less than 4,725,000 gallons (listed as "insignificant sources" on Title V Operating Permit V10-025); • Truck loading process including loading trucks at Rack and at Recovery Tanks; • Non-gasoline marine loading of petroleum/organic products with a Reid Vapor Pressure (RVP) of less than 4.0; • Fugitive emissions from light liquids and gasoline from pumps, valves, & flanges; • Removal of tank water bottoms (listed as "insignificant sources" on Title V Operating Permit V10-025); • Tank cleaning and repair (listed as "insignificant sources" on Title V Operating Permit V10-025); • Parts cleaner (listed as "insignificant sources" on Title V Operating Permit V10-025); • Additional fugitive emissions source (listed as "insignificant sources" on Title V Operating Permit V10-025); • Lubricity additive system at the North Terminal (listed as "insignificant sources" on Title V Operating Permit V10-025); • Lubricity additive system at the South Terminal (listed as "insignificant sources" on Title V Operating Permit V10-025); • Miscellaneous activities and equipment (listed as "insignificant sources" on Title V Operating Permit V10-025).	
Navy Foundry and Propeller Center (Navy Yard, Building 592)	X	X	**NOx Souces** Building 20 • Reverbatory Furnace; 18 MMBTU/hr Natural Gas • 2 Sand Core Ovens; 15 MMBTU/hr total Natural Gas • 2 Crucible Furnaces; <20 MMBTU/hr eachNatural Gas • Stress Relieving Oven; 20 MMBTU/hr Natural Gas • 2 Heat Treating Ovens; 8.8 MMBTU/hr each Natural Gas • 6 Ladle Preheaters; <20 MMBTU/hr each Natural Gas • 2 Small Ovens; <20 MMBTU/hr each Natural Gas • 5- air rotating units; 1.875 MMBTU/hr Natural Gas Powrmatic (Model # TE41) • 7- make-up air units; 3.0 MMBTU/hr Natural Gas Powrmatic (Model # GA-227) • 1- air handling unit; 0.4 MMBTU/hr Natural Gas Johnson York (Model # J20ZJN32P4AAA1) • 1- Make-up air unit; 1.25 MMBTU/hr Natural Gas Powermatic (Model # MA-100) • 1-Rooftop heater; 0.250 MMBTU/hr Natural Gas Reznor (Model # RDH-250) • Emergency Generator; 20 KW Natural Gas Building 546 • 3- Air rotating units; 2.2 MMBTU/hr Natural gas Powrmatic (Model # TE41) • 2-Heater; 0.125 MMBTU/hr Natural Gas Modine (Model # HDS-125)	Page 138

			Building 592 • 1- Air rotation unit; 2.2 MMBTU/hr Natural gas Powrmatic (Model # TE41) Building 712 • 2- boilers; 0.52 MMBTU/hr Natural gas Weil McLain (Model # LGB-05-S) Building 1029 • 2- Air rotating units; 2.2 MMBTU/hr Natural gas Powrmatic (Model # TE51) **VOC Sources** Building #20 • Film Developing (X-ray, NDT room) Hydroquinone Building #1029 • Propeller Cleaning • Simple Green Industrial/ Keynote Cleaner	
Grays Ferry Cogeneration Partnership (2600 Christian Street)	X		• one (1) front wall fired boilers rated 1119 MMBTU/hr • one (1) combined cycle combustion turbine rated 1515 MMBTU/hr (135 MW)	Page 141
Temple University – Main Campus (Broad Street and Montgomery Avenue)	X		• 16 Boilers and hot water heaters <20 MMBTU/hr • 5 Boilers >= 20 MMBTU/Hr and <50 MMBTU/Hr • three (3) BMCEP Boilers (Victory Energy Models VS-4-68), with a natural gas heat input rating of 91.3 MMBTU/Hr and a #2 fuel oil heat input rating of 86.8 MMBTU/Hr • 10 Standby Electric Generating units each 2250 HP • 59 emergency generators and fire pumps, and 20 catalyst oxidizers	Page 149
Veolia-Energy Efficiency (PA) LLC (2600 Christian Street)	X		• two (2) new 297.91 MMBTU/hr boilers	Page 161

Table 2 – Facilities not applicable to the 1997 8-hour RACT

Facility (Address)	Determination
Philadelphia Ship Repair Inc. (5195 South 19th Street)	Not a major source of NO_x or VOC
Children's Hospital of Philadelphia (34th & Civic Center Boulevard)	Not a major source of NO_x or VOC
Northeast Water Pollution Control Plant (3899 Richmond Street)	Not a major source of NO_x or VOC
Southwest Water Pollution Control Plant (8200 Enterprise Avenue)	Not a major source of NO_x or VOC
Mondelez (formerly Nabisco) (12000 East Roosevelt Blvd.)	Not a major source of NO_x or VOC
The Bellevue (200 South Broad Street)	Not a major source of NO_x or VOC
Amerada Hess (1630 South 51st Street)	Not a major source of NO_x or VOC
Philadelphia Gas Works – Passyunk Plant (3100 Passyunk Avenue)	Not a major source of NO_x or VOC
The Philadelphian Condominium (2401 Pennsylvania Avenue)	Not a major source of NO_x or VOC
SEPTA – Berridge/Courtland (200 West Wyoming Avenue)	Not a major source of NO_x or VOC
Smith-Edwards-Dunlap (2867 East Allegheny Avenue)	Not a major source of NO_x or VOC
Interstate Brands (formerly Continental Baking) (9801 Blue Grass Road)	Shut Down
Budd Company (2450 West Hunting Park Avenue)	Shut Down
Amoco Oil (63rd Street and Passyunk Avenue)	Shut Down
Kurz-Hastings (10901 Dutton Road)	Shut Down
Lawrence-McFadden (7430 State Road)	Shut Down
Philadelphia Baking Company (Grant Avenue and Roosevelt Blvd.)	Shut Down
Rohm and Haas (5000 Richmond Street)	Shut Down
SBF Communications (3747 Ridge Avenue)	Shut Down
Tasty Baking (2801 Hunting Park Avenue)	Shut Down
Aldan Rubber (2701 East Tioga Street)	Shut Down
Braceland Brothers (7625 Suffolk Avenue)	Shut Down
Graphic Arts (4100 Chestnut Street)	Shut Down
O'Brien Cogeneration (later Calpine) – Northeast	Shut Down

(3900 Richmond Street)	
O'Brien Cogeneration (later Calpine) – Southwest (8200 Enterprise Avenue)	Shut Down
Pearl Pressman Liberty (912 North 5th Street)	Shut Down
Arbill (2207 West Glenwood Ave.)	Shut Down
Eastman Chemical (formerly McWhorter) (7600 State Road)	Shut Down
Transit America (One Red Lion Road)	Shut Down

Technical Memos

CITY OF PHILADELPHIA
Department of Public Health
Public Health Services
Air Management Services

InterOffice Memo

To: File

From: Edward Wiener, Chief of Source Registration

Date: September 17, 2014

Subject: 1997 8-Hour RACT Analysis for Philadelphia Energy Solutions Refining and Marketing LLC (PES)

I. Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

II. Company Information:

Philadelphia Energy Solutions Refining and Marketing LLC (PES) owns and operates a petroleum refinery at 3144 Passyunk Avenue, Philadelphia, PA 19145. The refinery was previously owned by Sunoco, Inc. (R&M). PES – Tank Farm is part of the main refinery, although it has a different AMS Plant ID and Title V operating permit.

III. Applicability for NOx and VOC RACT:

PES is a major source of NOx having potential NOx emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone NAAQS.

PES is a major source of VOC having potential VOC emissions greater than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

IV. 1-hour RACT:

PES, including the Tank Farm, is subject to the 1-hour RACT determination (PA Permit Numbers 51-1501 and 51-1517) dated August 1, 2000, and approved into the SIP by EPA on October 31, 2001, 66 FR 54942 under the facility's former name Sunoco Inc. (R&M) – Philadelphia.

V. Process Descriptions:

PES' emission sources include 27 refinery fuel gas-fired process heaters, 3 refinery fuel gas-fired boilers, 2 Fluid Catalytic Cracking Units (FCCUs), 5 diesel-fired non-emergency reciprocating internal combustion engines (RICE), 11 emergency generators and fire pumps, storage tanks, cooling towers, 2 loading operations, oil-water separators, and degreasers. More details about these processes can be found below.

Table 1 - NOx Sources

Location	Source	Permitted Capacity (MMBTU/hr unless noted)	Potential NO_x Emissions (TPY)
Point Breeze	Unit 210-13H1	235.4	107.2
Point Breeze	Unit 860-2H2	69.8	107.0
Point Breeze	Unit 860-2H3	174.7	124.7
Point Breeze	Unit 860-2H4	99.4	117.6
Point Breeze	Unit 860-2H5	155	110.7
Point Breeze	Unit 860-2H7	59	40.6
Point Breeze	Unit 864-PH1	80	58.5
Point Breeze	Unit 864-PH11	74	47.0
Point Breeze	Unit 864-PH12	85.1	44.4
Point Breeze	Unit 870-H01	97	14.9
Point Breeze	Unit 870-H02	53	8.1
Point Breeze	Unit 859-1H1	98	8.6
Girard Point	Unit 137 F-1	415	418.1
Girard Point	Unit 137 F-2	155	174.5
Girard Point	Unit 137 F-3	60	15.8
Girard Point	Unit 1332 H-2	60	10.5
Girard Point	Unit 1332 H-400	186	48.9
Girard Point	Unit 1332 H-401	233	61.2
Girard Point	Unit 433 H-1	260	39.9
Girard Point	Unit 1232 B-104	70	54.3
Point Breeze	Unit 868 FCCU	50,000 BPD feed rate	130.2
Girard Point	Unit 1232 FCCU	100,000 BPD feed rate	208.3
Girard Point	#3 Boilerhouse Boiler #37	495	86.7
Girard Point	#3 Boilerhouse Boiler #39	495	86.7
Girard Point	#3 Boilerhouse Boiler #40	660	115.6
Point Breeze/Girard Point	Engine IC-002	1.4	1.4
Point Breeze/Girard Point	Engine IC-005	0.2	1.0
Point Breeze/Girard	Engine IC-006	0.8	1.0

Location	Source	Permitted Capacity (MMBTU/hr unless noted)	Potential NO_x Emissions (TPY)
Point			
Point Breeze/Girard Point	Engine IC-007	0.7	0.7
Point Breeze/Girard Point	Engine IC-008	1.5	0.3

BPD = barrels per day

Table 2 – VOC Sources

Location	Source Name	Potential VOC Emissions (TPY)
Point Breeze/Girard Point	Combustion Units (the same heaters and boilers listed in Table 1)	122.6
Point Breeze/Girard Point	Cooling Towers: 210 Crude - 29,600 gpm 868 - 19,700 gpm Complex - 35,000 gpm 864 - 18,000 gpm 137 - 36,300 gpm 433 - 35,300 gpm 490 - 75,000 gpm 1232 - 57,000 gpm	56.3
Point Breeze	Unit 868 FCCU	
Girard Point	Unit 1232 FCCU	8.2
Point Breeze/Girard Point	Engines (same as listed in Table 1)	

Sources Evaluated for RACT Separately

On August 31, 2012 PES submitted Plan Approval Application No. 12195 to replace the existing RACT limits for the following seven (7) process heaters:

- Unit 231 B101 Heater (rated capacity 104.5 MMBTU/hr)
- Unit 865 11H1 Heater (rated capacity 87.3 MMBTU/hr)
- Unit 865 11H2 Heater (rated capacity 64.2 MMBTU/hr)
- Unit 210 H101 Heater (rated capacity 192.0 MMBTU/hr)
- Unit 210 H201A/B Heater (rated capacity 254.0 MMBTU/hr)
- Unit 866 12H1 Heater from (rated capacity 61.2 MMBTU/hr)

- Unit 868 8H101 Heater from (rated capacity 60.0 MMBTU/hr)

As part of the application, PES revised RACT requirements and re-evaluated RACT for each of these 7 heaters. AMS has submitted separately to EPA for approval a RACT determination for these 7 heaters. As a result, these heaters are not part of this RACT evaluation.

VI. RACT Evaluation

On September 11, 2014, PES submitted to AMS the "PES RACT Update September 2014 Revision," which includes a full case-by-case RACT analysis for the remaining NOx emission sources listed as "Case-by-case" above. AMS has reviewed and concurs with PES analysis, which is attached to this document and submitted to EPA as part of the SIP revision.

A. NOx RACT

Table 3 below lists the 1-hour RACT requirements for the existing NOx sources. The permitted capacity includes any 1-hour RACT limits. Some permitted capacities and fuel types have changed since 1-hour RACT and will not match the current information found elsewhere in this document.

Table 3- List of Sources and Applicable 1-hour RACT Requirements

Location	Source	Permitted Capacity (MMBTU/hr unless noted)	Fuel	1-hour RACT		
				NO_x RACT Category	RACT Requirement	Emission Limit
Point Breeze	Unit 210-13H1	235.4	Refinery oil and refinery gas	Case-by-case	Combustion tuning	0.104 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil
Point Breeze	Unit 860-2H2	69.8	Refinery oil and refinery gas	Case-by-case	Combustion Tuning	0.350 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil
Point Breeze	Unit 860-2H3	174.7	Refinery oil and refinery gas	Case-by-case	Combustion Tuning	0.163 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil
Point Breeze	Unit 860-2H4	99.4	Refinery oil and refinery gas	Case-by-case	Combustion Tuning	0.270 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil
Point Breeze	Unit 860-2H5	155	Refinery oil and refinery gas	Case-by-case	Combustion Tuning	0.163 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil
Point Breeze	Unit 860-2H7	59	Refinery oil and refinery gas	Case-by-case	Combustion Tuning	0.157 lb NOx/ MMBTU for gas and 0.4 lb NOx/

Location	Source	Permitted Capacity (MMBTU/hr unless noted)	Fuel	1-hour RACT		
				NO_x RACT Category	RACT Requirement	Emission Limit
						MMBTU for oil
Point Breeze	Unit 864-PH1	80	Refinery oil and refinery gas	Case-by-case	Combustion Tuning	0.167 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil
Point Breeze	Unit 864-PH11	74	Refinery oil and refinery gas	Case-by-case	Combustion Tuning	0.145 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil
Point Breeze	Unit 864-PH12	85.1	Refinery oil and refinery gas	Case-by-case	Combustion Tuning	0.119 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil
Point Breeze	Unit 870-H01	97	Refinery gas	N/A[2]	N/A[2]	N/A[2]
Point Breeze	Unit 870-H02	53	Refinery gas	N/A[2]	N/A[2]	N/A[2]
Point Breeze	Unit 859-1H1	98	Refinery gas	N/A[2]	N/A[2]	N/A[2]
Girard Point	Unit 137 F-1	415[1]	Refinery oil and refinery gas	Case-by-case	Combustion Tuning	0.230 lb NOx/ MMBTU on a rolling 30-day average for gas and oil.
Girard Point	Unit 137 F-2	155[1]	Refinery oil and refinery gas	Case-by-case	Combustion Tuning	0.257 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil
Girard Point	Unit 137 F-3	60	Refinery oil	Case-by-case	Combustion Tuning	0.4 lb NOx/ MMBTU
Girard Point	Unit 1332 H-2	60	Refinery gas	Case-by-case	Combustion Tuning	0.300 lb NOx/ MMBTU
Girard Point	Unit 1332 H-400	186[1]	Refinery gas	Case-by-case	Combustion Tuning	0.156 lb NOx/ MMBTU
Girard Point	Unit 1332 H-401	233	Refinery gas	Case-by-case	Combustion Tuning	0.156 lb NOx/ MMBTU
Girard Point	Unit 433 H-1	243[1]	Refinery gas	Case-by-case	ULNB and Combustion Tuning	0.060 lb NOx/ MMBTU
Girard Point	Unit 1232 B-104	70[1]	Refinery gas	Case-by-case	ULNB and Combustion Tuning	0.177 lb NOx/ MMBTU
Point Breeze	Unit 868 FCCU	50,000 BPD feed rate	Refinery gas	Case-by-case	Good Combustion and CO Promoter	569 tons NOx per year on a 365-day rolling avg.
Girard Point	Unit 1232 FCCU	100,000 BPD feed rate	Refinery gas	Case-by-case	-	-
Girard Point	#3 Boilerhouse Boiler #37	495[1]	Refinery oil and refinery gas	Case-by-case	ULNB	0.330 lb NOx/ MMBTU for both fuels
Girard Point	#3 Boilerhouse Boiler #39	495[1]	Refinery oil and refinery gas	Case-by-case	ULNB	0.330 lb NOx/ MMBTU for both

Location	Source	Permitted Capacity (MMBTU/hr unless noted)	Fuel	1-hour RACT		
				NO_x RACT Category	RACT Requirement	Emission Limit
						fuels
Girard Point	#3 Boilerhouse Boiler #40	660[1]	Refinery oil and refinery gas	Case-by-case	ULNB	0.330 lb NOx/ MMBTU for both fuels
Point Breeze/Girard Point	Engine IC-002	1.4	Diesel	Case-by-case	N/A[2]	N/A[2]
Point Breeze/Girard Point	Engine IC-005	0.2	Diesel	Case-by-case	N/A[2]	N/A[2]
Point Breeze/Girard Point	Engine IC-006	0.8	Diesel	Case-by-case	N/A[2]	N/A[2]
Point Breeze/Girard Point	Engine IC-007	0.7	Diesel	Case-by-case	N/A[2]	N/A[2]
Point Breeze/Girard Point	Engine IC-008	1.5	Diesel	Case-by-case	N/A[2]	N/A[2]
Point Breeze/Girard Point	11 Emergency Generators and Fore Pumps	856 HP or less	3 Diesel 8 ULSD	Presumptive	N/A[2]	N/A[2]

[1] Indicates a "capped" heat input, rather than maximum capacity, which were approved as part of the 1-hour RACT.

[2] Units were not part of 1-hour RACT

The RACT plan approval approved in the SIP under the 1-hour ozone standard contains only case-by-case requirements for the emissions units identified as such in Table 1 above. Under 1-hour RACT, some boilers and heaters are required to have ULNB as RACT. Combustion units without NOx controls and not subject to presumptive requirements were required to have annual combustion tuning (CT). Some boilers and heaters have heat input caps in MMBTU/hr (as identified with the footnote "1" in Table 1). To determine compliance with these caps, the facility is required to monitor fuel input for these boilers in a daily basis. In addition, all combustion units above 50 MMBTU/hr have lbs NOx/MMBTU limits, mostly for both gas and oil burning. While most units at the time of the 1-hour RACT evaluation could burn both refinery fuel gas and refinery fuel oil, regular oil use by boilers and heaters was phased out of the facility by the end of 2010 as a requirement in a May 24, 2005 Consent Decree between EPA, several states, the City of Philadelphia, and Sunoco, Inc. While the Consent Decree allows PES to burn oil in certain circumstances, such as gas curtailments, PES has completely stopped burning oil and is removing the ability to burn oil in its 8-hour RACT.

Additionally, the following units were subject to case-by-case requirements under the 1-hour RACT determination, but have since been shut down:

- #3 Boiler House Boiler #38
- 22 Boiler House Boilers #1

- 22 Boiler House Boilers #2
- 22 Boiler House Boilers #3
- 859 Heater 1H1 (76 MMBTU/hr) – This is a different unit from the 98 MMBTU/hr 859 Heater 1H1 listed below.
- 859 Heater 1H2
- 859 Heater 1H3
- 864 Heater PH3
- 864 Heater PH4
- 864 Heater PH5
- 861 Heater 3H1S
- 861 Heater 3H1N
- 860 Boiler 2H9

Thus, AMS is not evaluating RACT for these units. Further, AMS is requesting that the applicable RACT requirements be removed from the SIP.

The following units were installed after the 1-hour RACT:

- PB Unit 870 Heater H01 (97 MMBTU/hr, refinery gas)
- PB Unit 870 Heater H02 (53 MMBTU/hr, refinery gas)
- PB Unit 859 Heater 1H1 (98 MMBTU/hr, refinery gas) – This unit was installed in 2009 as part of the Unit 859 reactivation project and is a different unit from the 76 MMBTU/hr 859 Heater 1H1 listed above.

No internal combustion engines were included in the 1-hour RACT. The facility has the following internal combustion engines:

- Eleven (11) emergency generators or emergency fire pumps. The largest unit is 896 HP. Three (3) units burn diesel, eight (8) burn ultra low sulfur diesel (ULSD).
- Five (5) non-emergency units used with pumps or compressors. The largest unit is 214 HP. Each unit burns diesel. Each unit was permitted after 1-hour RACT

The following incinerators and flares are control devices that emit NOx when burning/controlling VOCs:

- Unit 867 Sulfur Recovery Unit (SRU) Flare
- North Flare
- South Flare
- Acid Gas Flare
- SWS Flare
- LPG Flare (Propane Loading Station)

- Marine Vapor Recovery (40 MMBTU/hr)
- 1231/1232 Flare
- 433 Flare
- 1232 FCCU CO Boiler (580 MMBTU/hr)

i. Presumptive RACT for NOx:

Each heater listed as Presumptive above is subject to the presumptive RACT requirements of 25 PA Code Sections 129.93(b)(2)-(5). An annual adjustment or tune-up shall be performed on each unit.

Each emergency generator or fire pump is subject to the presumptive RACT requirements of 25 PA Code Section 129.93(c)(5). Each unit must be installed, maintained, and operated in accordance with manufacturer's specifications.

The following control devices are applicable to the presumptive RACT requirements of 25 PA Code Section 129.93(c)(4): Unit 867 SRU Incinerator, North Flare, South Flare, Acid Gas Flare, SWS Flare, LPG Flare, Marine Vapor Recovery Unit, 1231/1232 Flare, 433 Flare, and 1232 FCCU CO Boiler. Each unit must be installed, maintained, and operated in accordance with manufacturer's specifications.

ii. Case-by-case RACT Analysis for NOx:

Boilers and Heaters

PES has 27 heaters and three (3) boilers. As mentioned above, seven (7) of the heaters were evaluated for RACT separately and are not being addressed in this document. The potential NOx emissions listed in Table 1 for the heaters and boilers are based on the rated capacity and the permitted lbs/MMBTU NOx emission limit for each unit.

For these case-by-case heaters and boilers, the following control options are available, including estimated NOx reduction, and were evaluated:

- Ultra Low NOx Burners (ULNBs) and Selective Catalytic Reduction (SCR) – 96%
- SCR – 85%
- ULNBs – 50-91% (Assumes modern ULNBs control emissions to 0.03 lbs/MMBTU. The NOx emission reduction varies, depending on the unit's current NOx emission rate.)
- Low NOx Burners (LNBs) and Selective Non-Catalytic Reduction (SNCR) – 70%
- LNBs and Flue Gas Recirculation (FGR) – 55%
- SNCR – 40%

Control Device Descriptions:

- ULNBs and LNBs are burners designed to create a larger, lower temperature flame, which reduces thermal NOx.
- SCR injects a nitrogen based reagent such as ammonia into the exhaust upstream of a catalyst. NOx, ammonia (NH3), and oxygen (O2) react on the surface of the catalyst to form nitrogen (N2) and water (H20).
- SNCR is similar to SCR, but does not use a catalyst.

A summary of the available controls evaluated as RACT for the heaters and boilers and their technical and economic feasibility are provided in Table 4 below. Baseline potential NOx emissions were used for all cost analyses provided. Some units had controls installed after 1-hour RACT, as identified in the Existing Control column in Table 4 below. Emissions from existing controls were considered as baseline for the RACT evaluation.

Table 4 - Summary of NOx Controls Evaluated as RACT – Boilers and Heaters

		Technical Feasibility and Cost Effectiveness ($/Ton)					
Source	**Existing Control**	**ULNB & SCR**	**SCR**	**ULNB**	**LNB & SCR**	**LNB & FGR**	**SNCR**
Unit 210-13H1	CT	Infeasible	Infeasible	8,178	6,597	Infeasible	7,969
Unit 860-2H2	CT	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible	4,038
Unit 860-2H3	CT	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible	5,831
Unit 860-2H4	CT	Infeasible	Infeasible	4,483	15,584	Infeasible	4,499
Unit 860-2H5	CT	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible	6,099
Unit 860-2H7	CT	Infeasible	Infeasible	Infeasible	Infeasible	Infeasible	9,126
Unit 864-PH1	CT	Infeasible	Infeasible	4,417	10,071	Infeasible	7,657
Unit 864-PH11	CT	Infeasible	Infeasible	5,262	10,588	Infeasible	9,029
Unit 864-PH12	CT	Infeasible	Infeasible	6,800	9,212	Infeasible	10,349
Unit 870-H01	ULNB [1]	ULNB installed	83,367	ULNB installed	ULNB installed	ULNB installed	32,583
Unit 870-H02	ULNB [1]	ULNB installed	105,351	ULNB installed	ULNB installed	ULNB installed	41,395
Unit 859-1H1	ULNB [1]	ULNB installed	145,188	ULNB installed	ULNB installed	ULNB installed	56,517
Unit 137 F-1	CT	18,603	7,438	13,270	15,476	18,464	3,104
Unit 137 F-2	CT	33,208	9,630	26,833	35,765	43,873	4,001
Unit 137 F-3	ULNB [1]	ULNB installed	58,635	ULNB installed	ULNB installed	ULNB installed	23,140
Unit 1332 H-2	ULNB [1]	ULNB installed	87,867	ULNB installed	ULNB installed	ULNB installed	34,528
Unit 1332 H-400	SCR [1]	SCR installed	SCR installed	20,172	SCR installed	SCR installed	SCR installed
Unit 1332 H-401	SCR [1]	SCR installed	SCR installed	20,172	SCR installed	SCR installed	SCR installed
Unit 433 H-1	ULNB	ULNB installed	57,170	ULNB installed	ULNB installed	ULNB installed	22,082

Unit 1232 B-104	ULNB	ULNB installed	18,837	ULNB installed	ULNB installed	ULNB installed	7,622
#3 Boilerhouse Boiler #37	ULNB + FGR [1]	ULNB & FGR installed	37,133	ULNB & FGR installed	ULNB & FGR installed	ULNB & FGR installed	15,052
#3 Boilerhouse Boiler #39	ULNB + FGR [1]	ULNB & FGR installed	37,133	ULNB & FGR installed	ULNB & FGR installed	ULNB & FGR installed	15,052
#3 Boilerhouse Boiler #40	ULNB + FGR [1]	ULNB & FGR installed	34,060	ULNB & FGR installed	ULNB & FGR installed	ULNB & FGR installed	13,456

[1] Controls were installed after the 1-hour RACT determination, thus are not approved as RACT

For each boiler and heater, all additional NOx controls are either technically infeasible or economically unreasonable.

Table 5 - Existing and Proposed Case-by-Case RACT Requirements for Boilers and Heaters

Source	Permitted Capacity (MMBtu/ hr unless noted)	Approved RACT		Proposed RACT	
		RACT Control	Emission Limit	RACT Control	Emission Limit
Unit 210C-Heater 13H1	235.4	Combustion tuning	0.104 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil	Combustion tuning	0.104 lb NOx/ MMBTU for gas
Reformer 860- Heater 2H2	69.8	Combustion Tuning	0.350 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil	Combustion Tuning	0.350 lb NOx/ MMBTU for gas
Reformer 860- Heater 2H3	174.7	Combustion Tuning	0.163 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil	Combustion Tuning	0.163 lb NOx/ MMBTU for gas
Reformer 860- Heater 2H4	99.4	Combustion Tuning	0.270 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil	Combustion Tuning	0.270 lb NOx/ MMBTU for gas
Reformer 860- Heater 2H5	155	Combustion Tuning	0.163 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil	Combustion Tuning	0.163 lb NOx/ MMBTU for gas
Reformer 860- Heater 2H7	59	Combustion Tuning	0.157 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil	Combustion Tuning	0.157 lb NOx/ MMBTU for gas
Reformer 864- Heater PH1	80	Combustion Tuning	0.167 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil	Combustion Tuning	0.167 lb NOx/ MMBTU for gas
Reformer 864- Heater PH11	74	Combustion Tuning	0.145 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil	Combustion Tuning	0.145 lb NOx/ MMBTU for gas
Reformer 864- Heater PH12	85.1	Combustion Tuning	0.119 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil	Combustion Tuning	0.119 lb NOx/ MMBTU for gas
Unit 870-Heater H01	97	N/A	N/A	ULNB	0.035 lb NOx/MMBTU

Source	Permitted Capacity (MMBtu/ hr unless noted)	Approved RACT		Proposed RACT	
		RACT Control	Emission Limit	RACT Control	Emission Limit
Unit 870-Heater H02	53	N/A	N/A	ULNB	0.035 lb NOx/MMBTU
Unit 859-Heater 1H1	98	N/A	N/A	ULNB	0.035 lb NOx/MMBTU
Unit 137 Heater F-1	415	Combustion Tuning	0.230 lb/ MMBTU on a 30-day rolling average	Combustion Tuning	0.230 lb/ MMBTU on a 30-day rolling average
Unit 137 Heater F-2	155	Combustion Tuning	0.257 lb NOx/ MMBTU for gas and 0.4 lb NOx/ MMBTU for oil	Combustion Tuning	0.257 lb NOx/ MMBTU for gas
Unit 137 Heater F-3	60	Combustion Tuning	0.4 lb NOx/ MMBTU for oil	ULNB	0.060 lb NOx/MMBTU for gas
Unit 1332 Heater H-2	60	Combustion Tuning	0.300 lb NOx/ MMBTU for gas	ULNB	0.040 lbs/MMBTU
Unit 1332 Heater H-400	186	Combustion Tuning	0.156 lb NOx/ MMBTU for gas	SCR	0.06 lb/MMBTU on a rolling 365-day basis
Unit 1332 Heater H-401	233	Combustion Tuning	0.156 lb NOx/ MMBTU for gas	SCR	0.06 lb/MMBTU on a rolling 365-day basis
Unit 433 - Heater H-1	243	ULNB and Combustion Tuning	0.060 lb NOx/ MMBTU for gas	ULNB and Combustion Tuning	0.060 lb NOx/ MMBTU for gas
Unit 1232 - Heater B-104	70	ULNB and Combustion Tuning	0.177 lb NOx/ MMBTU for gas	ULNB and Combustion Tuning	0.177 lb NOx/ MMBTU for gas
#3 Boiler House Boiler #37	495	ULNB and Combustion Tuning	0.330 lbs NOx/MMBTU on a 30-day rolling average	ULNB + FGR	0.040 lb/MMBTU on a rolling 365-day basis
#3 Boiler House Boiler #39	495	ULNB and Combustion Tuning	0.330 lbs NOx/MMBTU on a 30-day rolling average	ULNB + FGR	0.040 lb/MMBTU on a rolling 365-day basis
#3 Boiler House Boiler #40	660	ULNB and Combustion Tuning	0.330 lbs NOx/MMBTU on a 30-day rolling average	ULNB + FGR	0.040 lb/MMBTU on a rolling 365-day basis

Conclusions and Recommendations

AMS recommends the following updates to the currently-approved RACT determination for the boilers and heaters above:

- Removing the ability to burn oil for all boilers and heaters. Emissions limits for burning oil will be removed.
- ULNB shall be the RACT control for the following heaters: Unit 870-H01, Unit 870-H02, Unit 859-1H1, Unit 137 F-3, and Unit 1332 H-2.
    - Unit 870-H01 and Unit 870 H02, and Unit 859-1H1 Heaters shall be given NOx emission limits of 0.035 lbs/MMBTU (matches limit in AMS Plan Approval 02184

dated May 12, 2004).

  - Unit 859-1H1 Heaters shall be given a NOx emission limit of 0.02 lbs/MMBTU (matches limit in AMS Plan Approval 06050 dated December 4, 2006).
  - Unit 137 F-3 Heater shall be listed as burning refinery fuel gas and shall be given a NOx emission limit of 0.060 lbs/MMBTU (matches limit in AMS Plan Approval 07163 dated February 5, 2008).
  - Unit 1332 H-2 Heater shall be given a NOx emission limit of 0.040 lbs/MMBTU (matches limit in AMS Plan Approval 05124 dated October 4, 2005).

- SCR shall be the RACT control for Unit 1332 H-400 and Unit 1332 H-401 Heaters. The NOx limit for each heater shall be changed from 0.156 lbs/MMBTU to 0.06 lbs/MMBTU on a rolling 365-day basis (matches limit in AMS Plan Approval 09040 dated February 1, 2010). These units shall have a NOx Continuous Emission Monitoring System (CEMS).
- FGR in addition to existing ULNB shall be the RACT control for #3 Boilerhouse Boilers #37, 39 & 40. The NOx limit for each boiler shall be changed from 0.330 lbs/MMBTU on a rolling 30-day to 0.040 lbs/MMBTU on a rolling 365-day basis (matches limit in AMS Plan Approval 08080 dated 11/2/10). These boilers are already required to have NOx CEMS in RACT.
- Removal of all conditions referring to the following shutdown units:
  - #3 Boiler House Boiler #38
  - 22 Boiler House Boilers #1
  - 22 Boiler House Boilers #2
  - 22 Boiler House Boilers #3
  - 859 Heater 1H1 (76 MMBTU/hr unit)
  - 859 Heater 1H2
  - 859 Heater 1H3
  - 864 Heater PH3
  - 864 Heater PH4
  - 864 Heater PH5
  - 861 Heater 3H1S
  - 861 Heater 3H1N
  - 860 Boiler 2H9

<u>Diesel-Fired Reciprocating Internal Combustion Engines (RICE)</u>

PES has five (5) diesel-fired RICE non-emergency units used with pumps or compressors. The largest is 214 HP. The potential NOx emissions in Table 1 are based on the rated capacity for each unit, AP-42 emissions factors for IC-002 and IC-005, Tier 1 standards for IC-006, Tier 3 standards for IC-007, and Tier 2 standards for IC-008.

SCR is the only technically feasible control device for each unit. SCR is economically unreasonable based on the cost per ton of NOx controlled, as is listed in Table 6 below.

Table 6 - Summary of NOx Controls Evaluated as RACT – Diesel-Fired RICE

		Technical Feasibility and Cost Effectiveness ($/Ton)					
Source	**Existing Control**	**ULNB & SCR**	**SCR**	**ULNB**	**LNB & SCR**	**LNB & FGR**	**SNCR**
Engine IC-002	CT	Infeasible	8,846	Infeasible	Infeasible	Infeasible	Infeasible
Engine IC-005	CT	Infeasible	7,180	Infeasible	Infeasible	Infeasible	Infeasible
Engine IC-006	CT	Infeasible	6,740	Infeasible	Infeasible	Infeasible	Infeasible
Engine IC-007	CT	Infeasible	9,041	Infeasible	Infeasible	Infeasible	Infeasible
Engine IC-008	CT	Infeasible	22,387	Infeasible	Infeasible	Infeasible	Infeasible

Table 7 - Existing and Proposed Case-by-Case RACT Requirements for Diesel-Fired RICE

Source	Permitted Capacity (MMBTU /hr)	Approved RACT		Proposed RACT	
		RACT Control	Emission Limit	RACT Control	Emission Limit
Engine IC-002	1.4	N/A	N/A	Good Combustion	N/A
Engine IC-005	0.2	N/A	N/A	Good Combustion	N/A
Engine IC-006	0.8	N/A	N/A	Good Combustion	N/A
Engine IC-007	0.7	N/A	N/A	Good Combustion	N/A
Engine IC-008	1.5	N/A	N/A	Good Combustion	N/A

Conclusions and Recommendations:

AMS recommends good combustion practices as RACT for each of the diesel-fired RICE units.

Fluid Catalytic Cracking Units (FCCU)

PES has two (2) FCCUs. The 868 FCCU is a full-burn unit that is permitted to operate up to 50,000 barrels in a single day. Under 1-hour RACT the unit has a NOx emission limit of 569 tons per rolling 12-month period and must follow good combustion practices and use a CO promoter in the regenerator. Potential NOx emissions in Table 1 are based on 47,500 barrels per day on a rolling 365-day average permit limit from AMS Plan Approval No. 00184 dated March 22, 2003 and a 50 ppmvd @ 0% oxygen limit from the Second Amendment of Civil Action No.05-02866 Consent Decree.

The 1232 FCCU is a partial–burn unit that is permitted to operate up to 100,000 barrels in a single day. It is equipped with a waste heat CO Boiler. It did not have any specific requirements under 1-

hour RACT. It had SCR installed after 1-hour RACT. Potential NOx emissions in Table 1 are based on a permit limit from AMS Plan Approval No. 04322 dated February 28, 2006.

The following control devices are available for controlling NOx emissions from FCCUs:

- SCR – Estimated 90% NOx control efficiency for FCCUs.
- LoTOx™ – This technology works in conjunction with a wet scrubber. It is a selective, low temperature oxidation technology that uses ozone to oxidize NOx to water soluble nitric pentoxide (N2O5), which, inside the wet scrubber, forms nitric acid that is subsequently scrubbed by the scrubber nozzles and neutralized by the scrubber's alkali reagent. Estimated 90% NOx control efficiency for FCCUs.
- SNCR – Estimated 40% NOx control efficiency for FCCUs.

SCR, SNCR, and LoTOx™ were evaluated as evaluated as technically feasible control options for the 868 FCCU.

Table 8 - Summary of NOx Controls Evaluated as RACT – Diesel-Fired RICE

		Technical Feasibility and Cost Effectiveness ($/Ton)		
Source	**Existing Control**	**SCR**	**SNCR**	**LoTOx™**
868 FCCU	Good Combustion and CO Promoter	33,563	12,159	13,328
1232 FCCU	SCR	SCR Installed	SCR Installed	SCR Installed

SCR, SNCR, and LoTOx™ are all economically unreasonable for the 868 FCCU based on cost per ton of NOx controlled.

Since no NOx control is more effective than SCR for an FCCU, no further control evaluation was performed on the 1232 FCCU. The SCR will be considered RACT for the unit under the 1997 8-hour ozone standard.

Table 9 - Existing and Proposed Case-by-Case RACT Requirements for FCCUs

Source	Permitted Capacity (MBPD)	Approved RACT		Proposed RACT	
		RACT Control	**Emission Limit**	**RACT Control**	**Emission Limit**
868 FCCU	50	Good Combustion	569 tons per rolling 12-	Good Combustion	100 ppmdv @ 0% O_2 on a 7-day rolling average, and

Source	Permitted Capacity (MBPD)	Approved RACT		Proposed RACT	
		RACT Control	Emission Limit	RACT Control	Emission Limit
		and CO Promoter	month period	and CO Promoter	130.2 tons per rolling 365-day period
1232 FCCU	100	N/A	N/A	SCR	30 ppmdv @ 0% O_2 on a 7-day rolling average and 208.28 tons per rolling 365-day period

Conclusions and Recommendations:

AMS recommends adding a 100 ppmdv @ 0% O_2 on a 7-day rolling average NOx limit and modifying the annual NOx limit to 130.2 tons per rolling 365-day period as 1997 8-hour RACT for Unit 868 FCCU. AMS recommends the existing SCR as 1997 8-hour RACT for Unit 1232 FCCU and adding a 30 ppmdv @ 0% O_2 on a 7-day rolling average NOx emission limit and a 208.28 tons per rolling 365-day period NOx emission limit (matches limits in AMS Plan Approval No. 04322 dated February 28, 2006). AMS recommends adding a requirement to operate a NOx CEMS on the Unit 868 FCCU and the Unit 1232 FCCU.

B. VOC RACT

The facility's air emissions sources contributing to VOC emissions include the following:

Location	Source Name	RACT Category	VOC RACT Summary
Point Breeze/Girard Point	Combustion Units [1]	Units < 50 MMBTU/hr Presumptive	Exempt - meets PA Code §129.93
		Units >= 50 MMBTU/hr Case-by-case	No RACT option for controlling VOC emissions
Point Breeze/Girard Point	Cooling Towers	Case-by-case	Inspection and maintenance/monitoring program for VOC fugitive emissions
Point Breeze	868 Fluid Catalytic Cracking Unit	Case-by-case	Full-burn unit, no RACT proposed
Girard Point	1232 Fluid Catalytic Cracking Unit	Case-by-case	Partial-burn unit

Point Breeze/Girard Point/Schuylkill River Tank Farm	Equipment Leaks	CTG	Exempt - meets PA Code §129.58
Point Breeze/Girard Point/ Schuylkill River Tank Farm	Wastewater Treatment Plant Oil/Water separators (Carbon canisters)	CTG	Exempt - meets PA Code §129.55
Point Breeze/Girard Point/ Schuylkill River Tank Farm	Storage Tanks	CTG	Exempt - meets PA Code §§129.56 and 129.57
Point Breeze	Stormwater Tank 7308, 7300	CTG	Exempt - meets PA Code §§129.56 and 129.57
Girard Point	Degreasers	CTG	Exempt - meets PA Code §129.63
Point Breeze/Girard Point	Loading Operations (Wharf)	CTG	Exempt - meets AMR V, Section V
Girard Point/ Schuylkill River Tank Farm	Loading Operations (Truck Rack)	CTG	Exempt - meets AMR V, Section V
Point Breeze/Girard Point	Diesel-Fired Emergency and Fire Pump RICE	Presumptive	Exempt - meets PA Code §129.93
Point Breeze/Girard Point	300 HP Diesel-Fired RICE [2]	Case-by-case	Good combustion practices

[1] The combustion units are the same boilers and heaters listed in the NOx RACT section.
[2] The diesel-fired RICE are the same units listed in the NOx RACT section.

i. CTG RACT [i.e. Applicable to EPA Control Technique Guideline (CTG)]:

The following sources are subject to RACT regulations that are approved in the SIP in accordance with EPA's Control Technique Guidelines (CTGs) for controlling VOC emissions.

Equipment leaks are applicable to 25 PA Code Section 129.58, which satisfies EPA's CTG RACT requirements for the control of VOC emissions in leaks from petroleum refinery equipment. In accordance with 25 PA Code Section 129.58, the facility must conduct a monitoring program for equipment leaks. This requirement has been approved in the SIP as part of the RACT plan approval.

Wastewater Treatment Plant Oil/Water Separators are applicable to the 25 PA Code Section 129.55, which satisfies EPA's RACT CTG requirements for the control of VOC emissions for VOC controls of refinery vacuum producing systems, wastewater separators, and process turnarounds. In accordance with 25 PA Code Section 129.55, containers, pumps, and compressors in the refinery must be sealed.

Storage Tanks and Stormwater Tank 7308 and7300 are applicable to 25 PA Code §§129.56 and 129.57, which satisfies EPA's CTG RACT requirements for the control of VOC emissions from

petroleum liquid storage. Tanks storing VOCs with a vapor pressure greater than 1.5 psia must have a floating roof or vapor recovery system and control device if the tank is greater than 40,000 gallons and a pressure relief valve meeting certain requirements if they are between 2,000 gallons and 40,000 gallons.

Degreasers are applicable to 25 PA Code Section 129.63, which satisfies EPA's CTG RACT requirements for the control of VOC emissions from solvent metal cleaning. Degreasers must meet certain equipment standards and operating requirements.

Loading Operations are applicable to the CTG RACT requirements of Air Management Regulation V, Section V. Loading organic materials with a RVP of 4.0 or greater requires a vapor recovery system.

ii. Presumptive RACT:

Combustion units (boilers and heaters) with a rated heat input equal to or greater than 20 MMBTU/hr but less than 50 MMBTU/hr are also rated 20 MMBTUare applicable to 25 PA Code Sections 129.93(b)(2)-(5). An annual adjustment or tuneup shall be performed on each unit.

Emergency generators and fire pumps are applicable to 25 PA Code Sections 129.93(c)(5). Each unit must be installed, maintained, and operated in accordance with manufacturer's specifications.

iii. Case-by-case RACT Analysis for VOC:

The PES April 2014 RACT Update submittal includes a full case-by-case RACT analysis for the VOC emission sources listed above. AMS accepted this analysis, which is being incorporated by reference.

<u>Combustion Units Rated 50 MMBTU/hr and Greater</u>

There were no specific 1-hour VOC RACT requirements for the combustion units (boilers and heaters) with a rated heat input of 50 MMBTU/hr or greater. There are no technically feasible VOC control options for the combustions units. It is not technically feasible to vent combustion unit exhausts to other combustion units like flares. Oxidation catalysts have not been demonstrated at refineries and are considered technically infeasible because the sulfur compounds found in refinery fuel gas poisons the catalyst. Most combustion units at the facility have potential VOC emissions below 5 tons per year.

Conclusions and Recommendations:
AMS recommends no VOC RACT controls for the combustion units.

<u>Cooling Towers</u>

The cooling towers emit fugitive VOC emissions when leaks in refinery heat exchangers allow VOCs to enter the cooling water streams and become volatilized when the cooling water passes through the cooling towers. The SIP-approved RACT plan approval requires an inspection and maintenance/monitoring program for VOC fugitive emissions from cooling towers. There are no add-on control devices for VOC emissions from cooling towers.

Conclusions and Recommendations:
AMS recommends the existing RACT requirements represent 1997 8-hour RACT for the cooling towers.

Fluid Catalytic Cracking Units (FCCUs)

The Unit 1232 FCCU at the Girard Point Refinery is a partial-burn unit that uses a carbon monoxide (CO) waste heat boiler to reduce VOC emissions to very low levels (potential VOC emissions are 8.2 tons per year). There are no specific 1-hour VOC RACT requirements for this unit.

The Unit 868 FCCU at the Point Breeze Refinery is operation as a full-burn unit, where minimal VOC and CO emissions are emitted in the exhaust gas after thermal regeneration of the catalyst. There are no specific 1-hour VOC RACT requirements for this unit.

The only VOC control device available for FCCUs is a CO Boiler, which can be used with partial burn units. CO boilers burn the CO in exhaust gases as fuel, converting it into CO2, and producing steam. Full-burn FCCUs do not emit CO in high enough concentrations to make CO boilers technologically feasible.

The Unit 1232 FCCU already has a CO boiler, the only VOC control option. A CO boiler is not technically feasible for the Unit 868 FCCU because it is a full-burn unit.

Conclusions and Recommendations for VOC RACT:
AMS recommends good combustion practices as 1997 8-hour RACT for Unit 1232 FCCU. No VOC RACT controls are available for Unit 868 FCCU.

Diesel-Fired RICE Units

Non-emergency diesel-fired RICE units are each under 300 HP, with potential VOC emissions of 1.8 tons per year or less, and are thus considered de minimis VOC sources.

Emergency diesel-fired RICE units are covered by the presumptive RACT requirements of 25 PA Code Section 129.93(c)(5), as mentioned in the NOx RACT section

Conclusions and Recommendations for VOC RACT:
AMS recommends no VOC RACT controls for non-emergency diesel-fired RICE units.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Kassahun Sellassie

Date: June 10, 2014

Subject: 1997 8-Hour RACT Analysis for Honeywell International, Frankford Plant

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Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Honeywell International (formerly Sunoco Chemical)– Frankford Plant owns and operates a chemical manufacturing facility located at 4700 Bermuda Street, Philadelphia, PA 19137-1193. The facility's air emissions sources include two 260 MMBTU/hr boilers, one 381 MMBTU/hr boiler, one (1) MMBTU/hr boiler, one (1) 50 HP boiler, eight (8) emergency generators, one (1) non-emergency air compressor, distillation columns, condensers, oxidation processes, reactors, phenol and alpha-methyl styrene loading, and storage tanks. Control devices include scrubbers, charcoal absorbers, a thermal oxidizer, and four catalytic oxidizers.

Applicability for NOx and VOC RACT:

Honeywell is a major source of NOx due to having potential NOx emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT. This facility is also a major source of VOC having potential VOC emissions greater than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS. The facility is a 1-hour RACT source (PA Permit Number 51-1551) dated July27, 1999, and approved into the SIP by EPA on 10/30/2001 (66FR 54710).

Process Descriptions:

I. Boilers
   (1) Boiler #1: 260 MMBTU/hr, firing waste residue, gas or #6 fuel oil
   (2) Boiler #2: 260 MMBTU/hr, firing waste residue, gas or #6 fuel oil
   (3) Boiler #3: 381MMBTU/hr, firing gas or #6 fuel oil only
   (4) Boiler at barge loading facility: 50 HP (below 20 MMBTU/hr), firing #2 fuel oil. -

II. Oxidation Processes: OX-501, OX-401, OX-301/302, OX-201/202. These units are used to manufacture synthetic organic chemicals.
III. Distillation Columns: CL-101, CL-111, CL-112, CL113, CL-114, CL-120, CL-121, CL-200, CL-201, CL-203, CL-204, CL-205, CL-206, CL-208, CL-220, CL-300, CL-301, CL-302, CL-303, CL-304, CL-305, CL-308, CL-601, PF-201, PF-301. These units are used to manufacture synthetic organic chemicals.
IV. Reactors: Decomposer Reactor:VT-208 and VT-307, Springer Reactor: VT-612, pH adjustment Reactor:VT-613, Plug Flow Reactors:PFR-1, PFR-2, PFR-3. These units are used to manufacture synthetic organic chemicals.
V. Barge Loading
VI. Tank Truck, Rail Car, and Drum Loading

VII. Storage Tanks: VT-609, VT-610, VT-332, VT-629, VT-630, VT-504, VT-119, VT-243, VT-117, VT-129, VT-131, VT-133, VT-229, VT-354, VT-355, VT-633, VT-234, VT-001, VT-002, VT-119, VT-121, VT-142, VT-143, VT-148, VT-229, VT-243, VT-244, VT-248, VT-248A, VT-249, VT-250, VT-332, VT-335, VT-650, VT-609, VT-610, VT-614, VT-617, VT-635, VT-610

VIII. Fugitive Emission Sources: pumps, valves, flanges, compressors, pressure relief valves, and rupture disks

IX. Rail Car Cleaning

X. Wastewater Facilities

RACT Analysis:

Presumptive or CTG RACT requirements

The following emissions units are subject to presumptive or CTG RACT requirements

I. Barge Loading Facility Boiler: The boiler at the barge loading facility is complying with **presumptive RACT requirements of PA 129.93(c).** This boiler has a capacity of less than 20 mmbtu/hr.

II. Oxidation Processes: These reactors shall be compliance with the CTG for SOCMI (AMR V Section XVI). All VOC emissions for each oxidation process shall be controlled by an overall control efficiency of 98% or maintain a TRE > 1. These are SOCMI sources use for Cumin oxidation use for phenol, acetone, and alpha-methyl styrene production. **This is covered under AMS CTG regulation AMR V Section XVI**

III. Distillation Columns: These distillation columns shall be compliance with the CTG for SOCMI (AMR V Section XVI). All VOC emissions for each distillation column shall be controlled by an overall control efficiency of 98% or maintain a TRE > 1. These are SOCMI sources use for phenol, acetone, and alpha-methyl styrene production. **This is covered under AMS CTG regulation AMR V Section XVI.**

IV. Reactors: These Reactors shall be compliance with the CTG for SOCMI (AMR V Section XVI). All VOC emissions for each reactor shall be controlled by an overall control efficiency of 98% or maintain a TRE > 1 or operate with a vent stream flow rate less than 0.011 scm/min. These are SOCMI sources use for phenol, acetone, and alpha-methyl styrene production and decomposition. **This is covered under AMS CTG regulation AMR V Section XVI**

V. Storage Tanks VT-609 and VT-610: Internal floating roofs are installed on tanks VT-609 and VT-610. These tanks store phenol and wastewater which has a vapor pressure of less than 1.5 psi. **This requirement has been approved as RACT in the 1-hour RACT determination and AMS proposes 1 hour RACT as 8 hr RACT due to deminimis emissions**. All others storage tanks comply with 25 PA Code Section 129.56 or 129.57, **which is applicable to Presumptive RACT** All others storage tanks comply with **25 PA Code Section 129.56 or 129.57**, **which is applicable to Presumptive RACT**

VI. **Fugitive Emission Sources (Equipment Leaks): Honeywell has implemented a L**eak Detection And Repair (LDAR) program for fugitive VOC emission sources. At a minimum this would **comply with AMS CTG Regulation AMR V Section XIII (B) for process Equipment Leaks and Presumptive RACT.**

De Minimis Emissions Sources

The following are considered sources with de minimis emissions of VOC, for which RACT will not be further evaluated:

I. Barge Loading: Honeywell shall not load any VOC with a vapor pressure in excess of 1.5 psia at 20 degrees Celsius without Air Management Services (AMS) approval. **This requirement has been approved as RACT in the 1-hour RACT determination**. AMS proposes the 1-hour RACT as 8-hour RACT. The VOC potential to emit (PTE) for this unit is 4.2 tons per rolling 12-months which is a de minims emissions that doesn't need further evaluation.

II. Truck, Rail, and Drum Loading: Truck, rail and drum loading at Honeywell are considered to be de minimis sources. The VOC PTE for these processes is 1.6 tons per rolling 12-month. **This is a de minims emission that doesn't need further analysis**.

III. Rail Car Cleaning: Rail car cleaning emissions shall not exceed 2.7 tons per rolling 12-month period. This requirement **has been approved as RACT in the 1-hour RACT determination**. This is a de minims

emission that doesn't need further analysis**. AMS proposes the 1-hour RACT as 8-hour RACT.**

IV. Wastewater Facilities: The thermal oxidizer will control VOC emissions from the air stripper at the wastewater facility. The thermal oxidizer will have destruction efficiency not less than 95%. This **requirement has been approved as RACT in the 1-hour RACT determination**. The PTE for VOC is 1.6 tons per rolling 12 –month period. This is a de minims emission that doesn't need further analysis. **AMS proposes the 1-hour RACT as 8-hour RACT.**

Case-by-Case RACT Analysis

Boilers #1 and #2

Units Description:
Boiler #1: 260 MMBTU/hr, firing waste residue, gas or #6 fuel oil
Boiler #2: 260 MMBTU/hr, firing waste residue, gas or #6 fuel oil

The following case-by-case requirements were approved for Boilers #1 & #2 in the 1-hour RACT determination:

- During the period of May 1st through September 30th, Boiler #1 and #2 shall only burn natural gas and waste residue except if there is a natural gas emergency. An emergency may include natural gas curtailment due to supply line failure into the plant or cases of a required environmental compliance-testing program. During such emergencies, #6 fuel oil may be used.

- Honeywell shall operate Boilers #1 and #2 on phenol residue (a non-fossil fuel) at 51% or greater annual heat input based on BTU value. Boiler #1 and #2 each has a NOx emission limitation not to exceed 0.35 pounds of NOx per MMBTU, and a combined NOx emissions limitation not to exceed 272 tons per year.

- Honeywell shall perform, at a minimum, the annual combustion tuning specifications as cited in 25 PA 129.93(b)(2) through (5).

These requirements are contained in Conditions 2A and 3A of the SIP-approved 1-hour RACT plan approval.

RACT/SIP Modification:

Improved efficiencies at the facility have reduced the amount of waste phenol residue produced, making it harder for the facility to meet the 51% minimum annual heat input requirement from this fuel. As a result, Honeywell requested changing the condition to burning phenol and natural gas combined at 51% or greater and #6 fuel oil would use up to 49% when there is natural gas curtailments occur. Because Boilers #1 & #2 can only burn #6 oil during interruptions and testing programs, this would require the facility to use natural gas to make up for the lower waste phenol burning, instead of No. 6 oil. No. 6 oil is the highest NOx emitting fuel for the boilers and testing and gas interruptions are infrequent. To illustrate the NOx emissions from burning the different types of fuel, below are the average NOx emissions from Boilers #1 and #2 during a one-month period, based on NOx CEM data.

Fuel Type	lbs NOx/MMBTU
No. 6 Oil	0.29
Waste Phenol Residue	0.19
Natural Gas	0.12

By switching from highly emitting #6 fuel oil to Natural gas, the facility will reduce NOx emissions by 200.88 tons per year (tpy) [(0.30 lb/mmbtu-0.12lb/mmbtu)*8760 hr/yr*260 mmbtu/hr*0.49*2 boilers= 200.88 tpy]. Thus, the proposed requirements are more stringent than the existing requirements.

AMS is proposing the following changes to the 1-hr RACT determination for Boilers #1 and #2:

The first two paragraphs of Condition 2A of the 1 hr RACT plan approval will be replaced by the following:

- Boiler #1 and Boiler #2 shall only burn natural gas and waste phenol residue except if there is a

natural gas curtailments and other losses of supply (e.g. PGW supply line failure or maintenance activity) or during stack testing programs (e.g. annual CEM RATA testing, annual combustion tuning, and combustion performance testing, as required). During such events No. 6 fuel oil may be used.

- Honeywell shall operate Boiler #1 and Boiler #2 each on waste phenol residue and natural gas combined 51% or greater.

Testing, Monitoring, and Recordkeeping: The existing continuous nitrogen oxides and oxygen monitors and recorders shall be operated on Boiler # 1 and Boiler #2 in order to measure and record the concentrations of these gases emitted from the boiler stack. All Testing, monitoring, and record keeping are in the Title V operating permit for the facility.

AMS is evaluating other control technologies that could further reduce NOx emissions from Boilers #1 and #2 as RACT. The following NOx control technologies were evaluated for case-by-case RACT:

- Selective Catalytic Reduction (SCR)
- Selective Non-Catalytic Reduction (SNCR)
- Low-NOx Burners (LNB)
- Ultra Low NOx Burner (ULNB)
- Fuel Switching
- Flue Gas Recirculation (FGR)
- Staged Combustion Air (SCA)

The boilers are each subject to Carbon Monoxide (CO) emission limits of 100 ppm per EPA's requirement in 40 CFR 63.1217(a). This impacts the technological feasibility of some of the NOx control technologies.

The following technologies were considered technologically infeasible:

- SCR – There is not enough room in the boiler house to house an SCR unit capable of treating the flue gas for the boilers. There are also concerns that frequent load swings and low load operation (10-15% capacity for significant periods) makes placement of the catalyst difficult and makes it difficult to maintain a proper ammonia injection rate for the varying NOx emission levels.
- SNCR – Load and NOx concentration variations with the boilers makes placement of the catalyst difficult and makes it difficult to maintain a proper ammonia injection rate.
- ULNB, LNB, FGR & SCA – All of these technologies make it difficult to comply with the existing 100 ppm CO limit. A representative from boiler manufacturer Babcock & Wilcox also expressed concern that these technologies would likely result in less complete combustion of the phenol residue. As required, Honeywell needs all burners in these boilers to be able to burn waste phenol residue, so it is not technologically feasible to compartmentalize burners and install these controls only for gas or oil burning.
- Fuel Switching – The facility has already eliminated No. 6 oil burning under most situations. Eliminating waste phenol burning would have a harmful effect on the facility's management of waste phenol residue and the overall operation of the facility.

None of these technologies were considered technologically feasible. Thus, no additional controls are determined as RACT for Boilers # 1 and 2. AMS recommends to revise the SIP to update the 1-hour RACT requirements as described above.

Boiler #3
Unit description: 381MMBTU/hr, firing gas or #6 fuel oil only

The following case-by-case RACT requirements were approved for Boiler #3 in the 1-hour RACT determination:

- Boiler #3: Honeywell shall maintain and operate the low NO_X burners installed on Boiler #3 on May 31, 1995.

- Boiler #3 shall not exceed 0.3 pounds of NOx per MMBtu.

- Honeywell shall perform, at a minimum, the annual combustion tuning specifications as cited in 25 PA 129.93(b)(2) through (5).

These requirements are contained in Conditions 2A and 3A of the SIP-approved 1-hour RACT plan approval.

AMS is requesting to incorporate the following condition into the 1997 8-hr RACT for Boiler #3:

- Boiler #3 can only burn No.6 oil during natural gas emergencies and stack test program.

By switching from highly emitting #6 fuel oil to Natural gas, the facility reduced NOx emissions by 147.18 tpy ((0.30 lb/mmbtu-0.12lb/mmbtu)*8760 hr/yr*381 mmbtu/hr*0.49 = 147.18 tpy). Thus, by adding this requirement RACT will be more stringent for Boiler #2.

AMS is evaluating other control technologies that could further NOx emissions from Boiler #3 as RACT.

Boiler #3, which has a capacity of 381 MMBTU/hr. Boiler #3 has a Low NOx burners and has a NOx emission limitation not to exceed 0.30 pounds of NOx per MMBTU.

The following were considered possible NOx controls for Boiler # 3:

- Water/Steam Injection (WI)
- Flue Gas Recirculation (FGR)
- Staged Combustion Air (SCA)
- Ultra Low-NO Burners (ULNB)
- Low-NO Burners (ULNB)
- Selective Non-Catalytic Reduction (SNCR)
- Selective Catalytic Reduction (SCR) and
- Ultra Low-NO Burners (ULNB) & Flue Gas Recirculation (FGR)

Detail analysis for each emission control technology as shown below:

- Water /Steam Injection – is not effective in reducing fuel NOx formation. For #6 fuel for boiler is not effective. This considered technically infeasible. Water/steam injection is used to reduce the flame temperature, thereby reducing the formation of thermal NOx, it is not effective in reducing fuel NOx formation. Water/steam injection is generally not employed in boilers because of a direct reduction in thermal efficiency and greater losses from the stack resulting from increase in moisture content of the flue gas. It is also unsafe combustion conditions result from poor fuel rate control. This method is used in gas turbine, reciprocating engines, and other **internal combustion engines**. This technology is *considered technically infeasible*.
- Flue Gas Recirculation (FGR) – This is more effective with NG and distillate fuel oil rather than residual fuel oil. This can be feasible if use with ULNB. Flue gas recirculation involves recycling a portion of the combustion gas to boiler. The low oxygen combustion product, when mixed with combustion air, reduces the excess combustion air; thereby, reducing the peak flame temperature and thermal NOx formation. However, there is insignificant effect on fuel NOx. As a result, FGR is effective with low nitrogen content fuels such as natural gas and distillate fuel oil rather than residual fuel oil. FGR is normally applied in combination with new low NOx burners because the performance of many burners is adversely affected with the introduction of new inert gases in the combustion zone. This technology by itself is *considered technically infeasible*.
- Staged Combustion Air (SCA)- Not considered retrofit to package boiler due to installation difficulties. This technology is considered *technically infeasible.*
- Ultra Low-NO Burners (ULNB)- This is applied to process heaters than boilers for fuel gas. This can be feasible when uses with FGR. ULNB/LNB burners are predominantly applied to process heaters or fuel gas or #2 fuel oil rather than boilers or residual fuel. LNB/ULNB on ICI boiler and residual oil fired could result in operational problem and it is impractical.
- Selective Non-Catalytic Reduction (SNCR). This technology is implemented for optimum exhaust gas temperature range of 1,200 ^{o}F to 2,000 ^{o}F, the normal operational temperature of boiler # 3 is 300 ^{o}F. Also a problem for resident time for ammonia of 3 to 5 seconds, in this case it doesn't fulfill all requirements. This technology is considered *technically infeasible*
- SCR – This technology *considered technically feasible*.
- ULNB + FGR– these technologies *considered technically feasible.*

Further Analysis for SCR and ULNB +FGR:

The following NOx controls were determined technologically feasible for Boiler No. 3. A summary of the cost-effectiveness for each control option is provided below. The baseline emission for Boiler #3 was determined based on the rated capacity of 381 MMBTU/hr, 8,760 hours per year, and a 0.30 lbs/MMBTU NOx emission limit. For more detailed calculations, please see the Appendix.

Source	Control Technology	Baseline NOx Emissions (tpy)	NOx Reduction (%)	NOx Reduction (tpy)	Total Annualized Cost	Cost Effectiveness ($/Ton)
Boiler #3	SCR	500.6	85	425.51	$1,632,154	$3,836
	ULNB +FGR	500.6	70	350.42	$5,791,297	$16,527
	LNB +FGR	500.6	50	250.3	$5,508,671	$22,008
	LNB	500.6	30	150.2	$683,016	$4,547

These controls were determined economically unreasonable, as cost-effectiveness of these options exceed $2,500/ per ton of NOx removed (AMS economic threshold for NOx RACT). Thus, for Boiler #3, AMS recommends to revise the SIP to update the 1-hour RACT requirements as described above.
Conclusions and Recommendations:

Conclusions and Recommendations:

AMS requests to revise the SIP to incorporate the modifications detailed above to the 1-hour RACT case-by-case determination for Bo ilers #1& #2. AMS also requests to revise the SIP to update 1-hour RACT case-by-case determination for Boiler #3, as detailed above. AMS also recommends that thess updates as well as th e remaining unchanged requirements approved in the 1-hour RACT determination represent NOx RACT for the 1997 8-hour ozone standard for Honeywell Frankford.

Appendix

Detail Calculations Summary for Boiler #3

The following costs are calculated in order to evaluate the cost effectiveness of each emission control technology:

- Total Capital Investment (TCI)
- Direct Annual Cost (DAC) ($/yr)
- NOx Emission Reduction (tons/yr)
- Cost Effectiveness ($/ton)

- **Capital Recovery** = Convert from P (present Value) to A(Annual amount),

  A=P(A/P,i%,n), $CR = \frac{i(1+i)^n}{(1+i)^n - 1}$ 15% interest and 10 yrs = A/P=0.1993

Where i= Annual interest Rate; n= control system life; Annual Cost = TCI x CRF

For the SCR Catalyst, The catalyst life is 5 years. The annual cost is given by the sinking fund factor, the amount of money the facility will need to set aside each year to be able to replace the catalyst at the end of its life, based on the lifespan of the catalyst and the interest rate.
Sinking Fund Factor (SFF) = Convert from F (Future) to A(Annual amount), A=F(A/F,i%,n),

$SFF = \frac{i}{(1+i)^n - 1}$ 10% interest and 5 yrs = A/F=0.1638

Where i= Annual interest Rate (10%); n= catalyst system life (5 years);

Catalyst Annual Cost = SFF x Catalyst Cost

$4NH_3 + 2NO_2 + O_2 \longrightarrow 3N_2 + 6H_2O$

Ammonia Cost = (17/46 * 4moles of NH_3/2 moles of NO2 *1.05 * NOx emission (tpy) *$410/ton*5 yrs)
NH_3 = Ammonia, NO_2 = Nitrogen Dioxide; O_2 = Oxygen; H_2O = Water; 1.05= 5% of Ammonia slip & waste Ammonia

Honeywell Boiler #3

Table 1 Detail Calculations for Honeywell Boiler #3 SCR

BOILER # 3	381 MMBTU/hr		
Total capital Cost			
Total Capital Investment Cost (TCI)	$5,341,400		TCI from the 2006 Best Available Control Technology (BART) submittal plus inflation adjustment to 2014 US dollars. The TCI includes equipment cost estimates from vendor-supplied estimates for similar units or industry data gathered for similar projects. This was used because it is similar to RACT analysis and it is more recent.
Capital Recovery	**$1,064,541**	**0.1993**	**10 yrs @15% -OAQPS[1] A/P=0.1993**
Annual Operating Costs			
Direct Annual Cost			
Electricity Cost[2]	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr
Operator[3]	$16,425		0.5hr/shift, 3 shift/day, $30/hr
Supervisor[3]	$2,463.75		15% of Operator
Maintenance[3]	$19,162.50		0.5hr/shift, 3 shift/day, $35/hr
Material[3]	$19,162.50		100% of Maintenance
Ammonia[3]	$183,945	0.1638	$26,091 total catalyst in 1999 and $36,789 in 2014 cost (A/F sinking value=0.1638) based on 5 yrs and 10% annual interest.
Catalyst Cost[3]	190,000	0.1638	Catalyst cost estimates from vendor-supplied estimates for similar units or industry data gathered for similar projects
Annual Catalyst Replacement Cost	31,122		
Total Direct Annual Cost	**$342,361**		
Indirect Annual Cost			
Overhead[3]	$11,498		60% of maintenance-OAQPS[1]
Administrative Charge[3]	$106,828		2% of TCI-OAQPS[1]
Property Taxes[3]	$53,414		1% of TCI-OAQPS[1]
Insurance[3]	$53,414		1% of TCI-OAQPS[1]
Total Indirect Annual Cost	**$225,154**		
Total Annual Operating Costs	**$1,632,055**		
NOx Emission Reduction (TPY)	425.51		
Cost Effectiveness ($/ton NOx removed)	**$3,836**		

Table 2 Detail Calculations for Honeywell ULNB + FGR

Boiler #3	381 MMBTU/hr		
Total capital Cost			
Total Capital Investment Cost (TCI)	**$23,621,000**		TCI from the 2006 Best Available Control Technology (BART) submittal plus inflation adjustment. The TCI includes equipment cost estimates from vendor-supplied estimates for similar units or industry data gathered for similar projects. This was used because it is similar to RACT analysis and it is more recent.
Capital Recovery	**$4,707,665**	**0.1993**	**10 yrs @15% -OAQPS[1] A/P=0.1993**
Annual Operating Costs			
Direct Annual Cost			
Electricity Cost[3]	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr
Operator[3]	$16,425		0.5hr/shift, 3 shift/day, $30/hr
Supervisor[3]	$2,463.75		15% of Operator
Maintenance[3]	$19,162.50		0.5hr/shift, 3 shift/day, $35/hr
Material[3]	$19,162.50		100% of Maintenance
Total Direct Annual Cost	**$127,294**		
Indirect Annual Cost			
Overhead[3]	$11,498		60% of maintenance-OAQPS[1]
Administrative Charge[3]	$472,420		2% of TCI-OAQPS[1]
Property Taxes[3]	$236,210		1% of TCI-OAQPS[1]
Insurance[3]	$236,210		1% of TCI-OAQPS[1]
Total Indirect Annual Cost	**$956,338**		
Total Annual Operating Costs	**$5,791,297**		
NOx Emission Reduction (TPY)	350.42		
Cost Effectiveness ($/ton NOx removed)	**$16,527**		

Table 3 Detail Calculations for Honeywell Boiler #3 LNB + FGR

Boiler #3	381 MMBTU/hr		
Total capital Cost			
Total Capital Investment Cost (TCI)	**$22,439,950**		TCI from the 2006 Best Available Control Technology (BART) submittal plus inflation adjustment. The TCI includes equipment cost estimates from vendor-supplied estimates for similar units or industry data gathered for similar projects. This was used because it is similar to RACT analysis and it is more recent.
Capital Recovery	**$4,472,282**	**0.1993**	**10 yrs @15% -OAQPS[1] A/p=0.1993**
Annual Operating Costs			
Direct Annual Cost			
Electricity Cost[2]	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr
Operator[3]	$16,425		0.5hr/shift, 3 shift/day, $30/hr
Supervisor[3]	$2,463.75		15% of Operator
Maintenance[3]	$19,162.50		0.5hr/shift, 3 shift/day, $35/hr
Material[3]	$19,162.50		100% of Maintenance
Total Direct Annual Cost	**$127,294**		
Indirect Annual Cost			
Overhead[3]	$11,498		60% of maintenance-OAQPS[1]
Administrative Charge[3]	$448,799		2% of TCI-OAQPS[1]
Property Taxes[3]	$224,400		1% of TCI-OAQPS[1]
Insurance[3]	$224,400		1% of TCI-OAQPS[1]
Total Indirect Annual Cost	**$909,096**		
Total Annual Operating Costs	**$5,508,671**		
NOx Emission Reduction (TPY)	250.3		
Cost Effectiveness ($/ton NOx removed)	**$22,008**		

Table 4 Detail Calculations for Honeywell Boiler #3 LNB

Boiler #3	381 MMBTU/hr		
Total capital Cost			
Total Capital Investment Cost (TCI)	**$2,274,237**		TCI from the 2006 Best Available Control Technology (BART) submittal plus inflation adjustment. The TCI includes equipment cost estimates from vendor-supplied estimates for similar units or industry data gathered for similar projects. This was used because it is similar to RACT analysis and it is more recent.
Capital Recovery	**$453,255**	**0.1993**	**10 yrs @15% -OAQPS[1] A/p=0.1993**
Annual Operating Costs			
Direct Annual Cost			
Electricity Cost[2]	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr
Operator[3]	$16,425		0.5hr/shift, 3 shift/day, $30/hr
Supervisor[3]	$2,463.75		15% of Operator
Maintenance[3]	$19,162.50		0.5hr/shift, 3 shift/day, $35/hr
Material[3]	$19,162.50		100% of Maintenance
Total Direct Annual Cost	**$127,294**		
Indirect Annual Cost			
Overhead[3]	$11,498		60% of maintenance-OAQPS[1]
Administrative Charge[3]	$45,485		2% of TCI-OAQPS[1]
Property Taxes[3]	$22,742		1% of TCI-OAQPS[1]
Insurance[3]	$22,742		1% of TCI-OAQPS[1]
Total Indirect Annual Cost	**$102,467**		
Total Annual Operating Costs	**$683,016**		
NOx Emission Reduction (TPY)	150.2		
Cost Effectiveness ($/ton NOx removed)	**$4,547**		

References:

- [1]Office of Air Quality Planning and standards (OAQPS) Environmental Protection Agency (EPA) Air Pollution Control Manual, Six Edition, EPA/452/B-02-001, January 2002.

- [2] **Electricity cost**: A.1 Vendor Information, A-2 Cost Calculation

- [3]**Cost calculations for each elements** are from references: North East States for Coordinated Air Use Management (NESCAUM), EPA' s Office of Air Quality Planning and standards (OAQPS) edition 6, 2002; Cost analysis and engineering economics book (Michael R. Lindeburg), from Facility, [1]Office of Air Quality Planning and standards (OAQPS) Environmental Protection Agency (EPA) Air Pollution Control Manual, Six Edition, EPA/452/B-02-001, January 2002 (page 2-27(2.5.5), I-52 table 1.13, Appendix A) and other States US Bureau of Labor Statics, Cost analysis and engineering economics book (Michael R. Lindeburg)

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Rahel Gebrekidan

Date: August 21, 2014

Subject: RACT Plan Approval Modification Summary for Paperworks Industries, Inc.

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Paperworks Industries owns and operates a paperboard manufacturing facility located at 5000 Flat Rock Road, Philadelphia, PA 19127. The facility was formerly named Jefferson Smurfit, Corporation.

Applicability for NOx and VOC RACT:

Paperworks Industries is a major source of NOx due to having potential emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT. The facility is therefore subject to the CAA RACT requirements. This facility is not a major source of VOC having potential emissions of less than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

The facility (under its former name of Jefferson Smurfit Corp.) submitted to AMS a case-by-case RACT analysis for the 1-hour ozone standard in June, 1994. As a result of the 1-hour RACT determination, AMS issued RACT plan approval on April 10, 1995, which was approved by EPA as a SIP revision on 10/31/2001 (66 FR 54947).

The facility's air emissions sources include two (2) 92.27 MMBTU/hr boilers firing natural gas and a 240 MMBTU/hr boiler firing natural gas and No. 6 oil.

RACT Evaluation:

Shutdown Units
A 225 MMBTU/hr boiler (Boiler #2), that was part of the 1-hour RACT plan approval, was shutdown in 2008.The Four Propane fueled infrared radiation heaters that used to be used as dryers for a millboard has been also shutdown.

Boiler #1
Boiler#1, with heat input rating of 240 MMBTU/hr and firing natural gas as primary fuel and #6 oil fuel as a back-up, is subject to 1-hour RACT. The SIP-approved NOx RACT Plan Approval includes the following requirements for Boiler#1:

- Installation of Low NOx gas burners with over fire air
- Modification of oil burners to Low NOx design with over fire air

In addition, the emission limits from Boiler #1 are the following:

- 0.30 lbs/MMBTU, 30 day rolling average when burning #6 oil, and
- 0.20 lbs/MMBTU, 30 day rolling average when burning natural gas

Boiler#1 is a Riley boiler with heat input rating of 240 MMBTU/hr. It is equipped with a Low NOx burner (LNB) with over fire air (OFA) when firing natural gas and #6 oil, as a back-up, as part of their 1-hour RACT plan approval and approved into the SIP. This unit was installed in 1934 and used to have the capability of burning coal but the facility has removed the burner and associated control method and the boiler is not allowed to burn coal started January, 2008 per the facility's Title V permit No. V10-009. This boiler used to have flue gas desulfurization and a baghouse as controls for Sulfur dioxide (SO2) and Particulate Matter (PM), respectively, while burning coal. Since the boiler is no longer allowed to burn coal, these control devices have been physically removed from the unit.

In addition to existing controls, other control strategies that may be considered for Boiler #1 for NOx RACT are as follows:

- Flue Gas Recirculation (FGR)
- Selective Non-Catalytic Reduction (SNCR)
- Selective Catalytic Reduction (SCR)

A detailed analysis for each emission control technology as RACT is provided below:

Flue Gas Recirculation (FGR)
This is a strategy that recycles a portion of the cooled flue gas back to the primary combustion zone and the NOx reductions are estimated to be about 20%.

Selective Noncatalytic Reduction (SNCR)
This technology relies on the use of a reagent such as ammonia or urea introduced into the stack gasses under optimum conditions. Reagent must be introduced into an oxygen rich stream in a tight temperature window. Too low a temperature can result in reagent being released to the atmosphere. Too high a temperature can actually result in the formation of NOx. This project would require extensive changes to the boiler and relatively large amounts of reagent necessary. Reductions in NOx flue gas concentrations are estimated to be about 40% for this boiler.

Selective Catalytic Reduction (SCR)

This technology also relies on the introduction of a reducing agent, principally ammonia, into the flue gases using some form of catalyst. Like SNCR this approach is highly dependent on stream temperature. The NOx reductions are estimated to be about 80%.

All these NOx controls are determined technologically feasible for Boiler No. 1. A summary of control effectiveness is provided for each technologically feasible control option.

Note. The baseline NOx emission was calculated based on the assumption of 100% No.6 fuel oil usage and calculated with 0.3 lb/MMBtu NOx RACT limit for burning oil which is the worst case scenario. Boiler #1 is allowed to burn No.6 fuel oil and natural gas, though the facility has been burning only natural gas for the past five years.

Source	Control Technology	Baseline NOx Emissions (tpy)	NOx Reduction (%)	NOx Reduction (tpy)	Total Annualized Cost	Cost Effectiveness ($/Ton)
Boiler #1	FGR	315.36	20	63.07	$282,627	$4,481
	SNCR	315.36	40	126.14	$ 465,327	$3,693
	SCR	315.36	80	252.29	$1,049,657	$4,165

All these controls are determined *economically unreasonable* because their respective cost-effectiveness are above $2,500/ton, which AMS has determined as the threshold for economic feasibility. For more detailed calculations, please see Appendix.

AMS has determined that the Low NOx burner with overfire air for natural gas and No.6 oil burning operation will remain NOx RACT for this boiler. Boiler #1 is no longer allowed to burn coal.

Conclusions and Recommendations:

AMS recommends that the 1-hour ozone RACT determination, dated April 4, 1995 and approved by EPA on October 31, 2001 still be considered to represent NOx RACT for the 1997 8-hour ozone standard for Boiler #1.

Boiler #3 & #4

Each boiler with heat input rating of 92.27 MMBTU/hr burns natural gas and is currently equipped with LNB and FGR. These units were installed in 2009 and were allowed to burn No.6 oil per Plan Approval No. 08179; however, the facility requested to modify this plan approval to remove the ability to burn No.6 oil on these boilers and redefined the boilers as "natural gas only" as of August 19, 2014. These boilers have the following requirements per AMS Pre-Construction Plan Approval No. 08179, dated December 30, 2008:

1. Paperworks shall install and operate LNB and FGR on each boiler
2. NOx emissions from each boiler shall not exceed the following: [25 Pa Code §127.1]
   a. 0.025 lbs/MMBTU burning natural gas

To comply with the above emission limits, Paperworks is operating the LNB and FGR.

In addition to existing controls, other control strategies that may be considered for boiler #3 and #4 for NOx RACT are as follows:

- Selective Non-Catalytic Reduction (SNCR)
- Selective Catalytic Reduction (SCR)

A detailed analysis for each emission control technology is provided below:

Selective Non-Catalytic Reduction
Selective non-catalytic reduction (SNCR) is a technology whereby an ammonia or ammonia based fluid (reducing agent) is injected into the exhaust air stream. Once the mixture comes in contact with the catalyst surface, a reduction reaction occurs, breaking down the NOx (NO or NO_2) and NH_3 into N_2 and H_2O. Reductions in NOx flue gas concentrations are estimated to be between 20% and 50% for boilers, depending on the reducing chemical used and effective control of optimal operating conditions (exhaust gas temperature). SNCR systems require relatively high gas operating temperatures. Steady temperatures in the range of 1,600 to 2,000°F are required to operate an SNCR system effectively. Selective non catalytic reduction ***is considered technically feasible.***

Selective Catalytic Reduction
Selective catalytic reduction (SCR) is a technology whereby an ammonia or ammonia-based fluid (reducing agent) is injected into the exhaust air stream upstream of a catalyst. Once the mixture comes in contact with the catalyst surface, a reduction reaction occurs, breaking down the NOx (NO or NO_2) and NH_3 into N_2 and H_2O. NOx emission reduction from Selective catalytic reduction is estimated to be 80%. SCR is ***considered technically feasible.***

A summary of control effectiveness is provided for each technologically feasible control option.

Note: For purposes of cost calculations in this evaluation the allowable maximum emission limits of 10.15 tons per rolling 12 month period calculated using the emission limits of 0.025lb/MMBTU for natural gas.

Source	Control Technology	Baseline NOx Emissions (tpy)	NOx Reduction (%)	NOx Reduction (tpy)	Total Annualized Cost	Cost Effectiveness ($/Ton)
Boiler #3	SCR	10.15	80	8.12	$186,102	$22,919
	SNCR	10.15	40	4.06	$202,909	$49,978

All these controls are determined *economically unreasonable* because their respective cost-effectiveness are above $2,500/ton, which AMS has determined as the threshold for economic feasibility. For more detailed calculations, please see Appendix.

Conclusion and recommendation
AMS has determined that the following existing emission limits, control technology, and monitoring and recordkeeping requirements shall be considered NOx RACT for each boiler as approved on AMS Pre-Construction Plan Approval No. 08179 dated 12/30/2008.

1. NOx emissions from each boiler shall not exceed the following: [25 Pa Code §127.1]
   a. 0.025 lbs/MMBTU while burning natural gas.
2. Each boiler shall be equipped with LNB and FGR
3. Each boiler shall only burn natural gas
4. Monitoring and record keeping requirements:
   a. Paperworks shall monitor and record monthly fuel usage for each boiler, and calculate monthly NOx emission for each boiler per rolling 12-month period.

Appendix

Summary of Cost-Effectiveness Calculations

The following were calculated in order to evaluate the cost effectiveness of each emission control technology:

- Total Capital Investment (TCI) ($)
- Annualized Capital Investment or Capital Recovery ($/yr)
- Total Annual Cost (TAC) ($/yr)
- Baseline NOx Emissions (tons/yr)
- NOx Emission Reduction (tons/yr)
- Cost Effectiveness ($/ton)

Capital Recovery

To convert from P (present Value) to A(Annual amount), A=P(A/P,i%,n),

$$CRF = \frac{i(1+i)^n}{(1+i)^n - 1}$$

Where i= Annual interest Rate; n= control system life;

Annualized Capital Investment cost = TCI x CRF

- For Boiler #1:
  i=10% interest and n=15 yrs
  CRF=0.1315

- For Boilers #3 and #4:
  i= 10% interest and n=20 yrs
  CRF=0.1175

Cost of the Catalyst in SCR

The annual cost is given by the sinking fund factor, the amount of money the facility will need to set aside each year to be able to replace the catalyst at the end of its life, based on the lifespan of the catalyst and the interest rate. The catalyst life is 5 years.

Sinking Fund Factor (SFF) = Convert from F (Future) to A(Annual amount), A=F(A/F,i%,n),

$$SFF = \frac{i}{(1+i)^n - 1}$$

Where i= Annual interest Rate (10%); n= catalyst system life;
For i=10% and n=5 yrs ; SFF=0.1638

Catalyst Annual Cost = SFF x Catalyst Cost

Cost of the Ammonia in SCR and SNCR (Based on EPA Cost Manual)

$2NH_3 + 2NO + ½ O_2 \longrightarrow 2N_2 + 3H_2O$

Ammonia cost =(17/30 * 1.05 *2 mole of Ammonia/2 mole of NO2 *NOx emission (tpy) *$410/ton

NH_3 = Ammonia (1.05 is assuming 5% ammonia slip)
NO_2 = Nitrogen dioxide
O_2 = Oxygen
H_2O = Water

Table 1- Detailed Calculations for FGR-Boiler #1

Total Capital Cost			
Total Capital Investment Cost (TCI)	**$838,695**		TCI from 1-hour RACT proposal plus inflation adjustment. Original TCI includes equipment cost estimates from vendor-supplied estimates for similar units.
Total Annual Costs			
Direct Annual Cost (DAC)			
Electricity Cost[1]	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr
Operator[1]	$16,425		0.5hr/shift, 3 shift/day, $30/hr
Supervisor[1]	$2,463.75		15% of Operator
Maintenance[1]	$19,162.50		0.5hr/shift, 3 shift/day, $35/hr
Material[1]	$19,162.50		100% of Maintenance
Total Direct Annual Cost	**$127,294**		
Indirect Annual Cost (IAC)			
Overhead[1]	$11,498		60% of maintenance-[1]
Administrative Charge[1]	$16,774		2% of TCI-[1]
Property Taxes[1]	$8,387		1% of TCI-[1]
Insurance[1]	$8,387		1% of TCI-[1]
Capital Recovery	$110,288		CRF * TCI; 15 yrs @10% (1-hour RACT Proposal); CRF= 0.1315
Total Indirect Annual Cost	**$155,334**		
Total Annual Costs	**$282,627**		
Baseline Emissions (TPY)	**315.36**		Assuming 100% No.6 fuel oil usage and calculated with 0.3 lb/MMBtu NOx RACT limit for burning oil, which is the worst case scenario.
NOx Emission Reduction (TPY)	**63.07**		Assuming 20% NOx reduction.

Cost Effectiveness ($/ton NOx removed)	**$4,481**		

Table 2- Detailed Calculations for SNCR- Boiler#1

Total Capital Cost			
Total Capital Investment Cost (TCI)	**$1,904,000**		TCI from 1-hour RACT proposal plus inflation adjustment. Original TCI includes equipment cost estimates from vendor-supplied estimates for similar units.
Total Annual Costs			
Direct Annual Cost			Based on EPA cost Manual
Electricity Cost[1]	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr
Operator[1]	$16,425		0.5hr/shift, 3 shift/day, $30/hr
Supervisor[1]	$2,463.75		15% of Operator
Maintenance[1]	$19,162.50		0.5hr/shift, 3 shift/day, $35/hr
Material[1]	$19,162.50		100% of Maintenance
Total Direct Annual Cost	**$127,294**		
Indirect Annual Cost			
Overhead[1]	$11,498		60% of maintenance[1]
Administrative Charge[1]	$38,080		2% of TCI[1]
Property Taxes[1]	$19,040		1% of TCI[1]
Insurance[1]	$19,040		1% of TCI[1]
Capital Recovery	$250,376		CRF * TCI; 15 yrs @10% -1-hour RACT Proposal; CRF= 0.1315
Total Indirect Annual Cost	**$338,030**		
Total Annual Costs	**$465,327**		
Baseline Emissions (TPY)	315.36		Assuming 100% No.6 fuel oil usage and calculated with 0.3 lb/MMBtu NOx RACT limit for burning oil, which is the worst case scenario.
NOx Emission Reduction (TPY)	126.14		Assuming 40% NOx reduction.
Cost Effectiveness ($/ton NOx	**$3,689**		

removed)			

Table 3- Detailed Calculations for SCR- Boiler #1

Total Capital Cost			
Total Capital Investment Cost (TCI)	**$3,825,000**		TCI from 1-hour RACT proposal plus inflation adjustment. Original TCI includes equipment cost estimates from vendor-supplied estimates for similar units
Direct Annual Cost			Based on EPA cost manual
Electricity Cost[1]	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr
Maintenance[1]	$57,375.0		0.015*TCI
Total Catalyst replacement Cost[1]	$31,122		SFF x Catalyst Catalyst Cost= $190,000; Cost; SFF=0.1638
Ammonia Cost	$76,932		Ammonia cost =(17/30 * 1.05 *2 mole of Ammonia/2 mole of NO2 *NOx emission (tpy)(315.36 tons) *$410/ton=
Total Direct Annual Cost	**$235,509**		
Indirect Annual Cost			
Overhead[1]	$34,425		60% of maintenance[1]
Administrative Charge[1]	$76,500		2% of TCI[1]
Property Taxes[1]	$38,250		1% of TCI[1]
Insurance[1]	$38,250		1% of TCI[1]
Capital recovery[1]	$502,988		CRF * TCI; 15 yrs @10% -1-hour RACT Proposal; CRF= 0.1315[1]
Total Indirect Annual Cost	**$690,413**		
Total Annual Costs	**$925,922**		
Baseline Emissions (TPY)	315.36		Assuming 100% No.6 fuel oil usage and calculated with 0.3 lb/MMBtu NOx RACT limit for burning oil, which is the worst case scenario.
NOx Emission Reduction (TPY)	252.29		Assuming 80% NOx reduction.
Cost Effectiveness ($/ton NOx removed)	**$3,670**		

Table 4- Detailed Calculations for SCR- Boilers #3 each (92.72 MMBTU/hr)

Total Capital Cost			
Total Capital Investment Cost (TCI)	$824,997		Based EPA Cost Control Manual of $6000/MMBTU/Hr. (Section 4, chapter 2, page 149) Escalated 1997 US $ using the Marshall and swift Index.
Capital Recovery	$96, 937		CRF * TCI; n=20 yrs, i=10%; CFR=0.01175[1]
Annual Costs			
Direct Annual Cost			Based EPA Cost Control Manual
Electricity Cost[1]	$5,606		8kw @ $0.08/kwh, 8760 hrs/yr
Ammonia Cost[1]	$2,476		Ammonia cost =(17/30 * 1.05 *2 mole of Ammonia/2 mole of NO2 *NOx emission (tpy)(10.15 tons) *$410/ton
Catalyst cost	$172,667		$122487 total catalyst in 1999 and $172,667 in 2014 cost
Catalyst Replacement Cost	$28,283	0.1638	SFF x Catalyst Cost SFF=0.1638, for n=5 yrs and i=10% SFF=0.1638;
Total Direct Annual Cost	**$185,737**		
Indirect Annual Cost			
Overhead	$11,498		60% of maintenance[1]
Administrative Charge[1]	$16,500		2% of TCI[1]
Property Taxes	$8,250		1% of TCI[1]
Insurance	$8,250		1% of TCI[1]
Total Indirect Annual Cost	**$137,362**		
Total Annual Costs	**$186,102**		
Baseline NOx Emissions (TPY)	10.15		Based on max. emissions rate of 0.025 lb/MMBTU for natural gas
NOx Emission Reduction (TPY)	8.12		Based on 80% reduction
Cost Effectiveness ($/ton NOx removed)	**$22,919**		

Table 5- Detailed Calculations for SNCR Boilers #3 and #4, each (92.72 MMBTU/hr)

Total Capital Costs			
Direct Capital Cost (DCC)[1] (SNCR system equipment, instrumentation, sales tax and freight. It also includes direct installation costs such as auxiliary equipment (e.g., ductwork, compressor), foundations and supports, handling and erection, electrical, piping, insulation and painting)	$843,925		Based EPA Cost Control Manual, Pages 1-31, 1-32, Table-1.4. (($950/MMBTU)* Q_B*(2375 MMBTU/hr/Q_B)^0.577*(0.66+0.85η_{NOx}) Where Q_B is max. potential heat input rate; η_{NOx} is the NOx removal efficiency.
Indirect Capital Cost (ICC)[1] (includes costs such as; construction and contractor fees, startup and testing, inventory capital, and any process and project)	$168,785		0.2 *(DC)
Contingency	$151,907		0.15*ICC*DCC
Total Capital Investment Cost (TCI)	**$1,164,617**		
Total Annual Costs			
Direct Annual Cost (DAC)			
Electricity Cost[1]	$701		1kw @ $0.08/kwh, 8760 hrs/yr
Maintenance[1]	$17,469		1.5% TCI
Ammonia[1]	$2,476		Ammonia cost =(17/30 * 1.05 *2 mole of Ammonia/2 mole of NO2 *NOx emission (tpy)(10.15 tons) *$410/ton
Total Direct Annual Cost	**$20,646**		
Indirect Annual Cost (IAC)			
Overhead	$10,481.40		60% of maintenance[1]
Administrative Charge[1]	$16,879		2% of TCI[1]
Property Taxes	$8,439		1% of TCI[1]
Insurance	$8,439		1% of TCI[1]
Capital Recovery	$136,842		CRF * TCI; n=20 yrs, i=10% [1] CRF=0.1175
Total Indirect Annual Cost	**$182,246**		
Total Annual Costs (TAC)	**$202,909**		TAC = DAC + IAC
Baseline NOx Emissions (TPY)	10.15		Based on max. emissions rate of 0.025 lb/MMBTU for natural gas
NOx Emission Reduction (TPY)	4.1		Based on 40% reduction
Cost Effectiveness ($/ton NOx	**$49,978**		

removed)			

REFERENCES:

1- EPA Cost Manual, 6th Edition, Jan 2002, Appendix A.2.3

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Biji Pandisseril

Date: May 19, 2014

Subject: 8-Hour RACT Analysis for Sun Chemical - (PLID # 02052)

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of VOC and NOx. Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Sun Chemical manufactures and distributes commercial printing ink in Philadelphia, Pennsylvania. Specifically, the manufacturing process at the Philadelphia facility produces solvent-based and water-based printing ink for the packaging industry, and middle distillate oil-based printing ink for the web publication industry.

Applicability for NOx and VOC RACT:

Sun Chemical is not a major source for Nitrogen Oxides (NOx) emission having potential NOx emissions less than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone NAAQS. The facility is a major source of Volatile Organic Compounds (VOC) having potential VOC emissions is greater than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

Process Descriptions:

Sun Chemical VOC emission sources include Manufacturing Group 140 – Conventional Blends, Manufacturing Group 140 – Rotor Stator Production, Manufacturing Group 142 – Horizontal Mill Station, Manufacturing Group 141 – Ball Mill Production, and Manufacturing Group 143 – Kady Mill Production. The facility also has fugitive emissions from underground tanks.

The Manufacturing Group 140 – Conventional Blends include 25 mixers, 3 bench-top mixers, and 2 tanks.
The Manufacturing Group 140 – Rotor Stator Production include 5 mixers.
The Manufacturing Group 142 – Horizontal Mill Station include 2 mixers
The Manufacturing Group 141 – Ball Mill Production include 1 ball mill
The Manufacturing Group 143 – Kady Mill Production include 4 kady mills.

RACT Analysis:

I. Manufacturing Group 140 – Conventional Blends

Materials processed in this area are typical of solvent-based inks. There are three processing stages involved with this manufacturing group: raw material addition, mixing and packaging into customer ready containers.

Description:

Ink is processed in the conventional blending area using standard post mixer equipped with a radial dispersion blade. Raw materials for each batch are manually dispensed into the mixing vessel. The vessel is brought to the mixer for blending.

Drums of raw material are retrieved from the warehouse, covers are removed and the material is poured into the mixing vessel. Typically, the vessel is equipped with casters and is pushed / pulled into position at the mixer. Once homogeneous, a sample is taken to the lab for analysis. Adjustments are made to the batch as necessary; when the mixture is approved for quality, the mixing vessel is removed from the mixer and brought to the packaging area, where the ink is dispensed into shipping containers.

The mixing unit is washed using a solvent compatible with the prior batch. The wash cycle is implemented to prevent color contamination between batches.

The following were considered possible VOC controls: vessel covers; water-cooled vessel covers; condensers with water-cooled vessel covers; and Raw Material Dispensing – Transfer Pump.

Evaluation of Proposed Control Systems

1) Raw Material Dispensing – Transfer Pump

The addition of raw materials is conducted manually. Drums of raw material are retrieved from the warehouse, covers are removed and the material is poured into the mixing vessel.

One technique considered for raw material additions includes dispensing from a closed head drum by using a transfer pump instead of the current practice of dispensing from an open drum.

Use of a transfer pump is **technically infeasible** because colored ink concentrate and solvent residues will cling to the inside and outside of the pump, creating potential for contamination of the product. Cleaning of the pump would be required, which would increase net VOC emissions.

The following control options are technically feasible:

(a) Vessel Covers

The mixing operation for these manufacturing groups are characterized by short, slow speed mix cycles and therefore are expected to generate a relatively minor amount of VOCs.

(b) Water Cooled Vessel Covers

Water-cooled vessel covers for the mixing stations results in incrementally higher control efficiency.

(c) Condenser and Water-Cooled Vessel Covers

This technology also considered for VOC emission control technology.

Source	Control Technology	Baseline Emission NOx (tpy)	NOx Reduction (%)	NOx Reduction (tpy)	Total Annualized Cost	Cost Effectiveness ($/Ton)
Blends production	Vessel Cover	11.895	35.9	4.27	$164,905	38,619
	Water Cooled Cover	11.895	43.59	5.185	$348,543	67,221
	Water Cooled Cover and Condenser	11.895	47.69	5.673	$560,375	98,779
Vessel clingage	Vessel Cover	2.75	100	2.75	$164,905	59,965
	Water Cooled Cover	2.75	100	2.75	$348,543	126,743
	Water Cooled Cover and	2.75	100	2.75	$560,375	203,773

	Condenser					
Clean up	Vessel Cover	9.15	16.67	1.525	$164,905	108,134
	Water Cooled Cover	9.15	16.67	1.525	$348,543	228,553
	Water Cooled Cover and Condenser	9.15	16.67	1.525	$560,375	367,459

All of these technologies are determined economically unreasonable. Please see the Appendix for more details on the calculations.

Conclusions and Recommendations:

It is recommended that the 1-hour ozone RACT in the RACT Plan Approval (PA Permit Number 51-2052) dated on July 14, 2000 and approved by EPA as 1-hr RACT on 10/31/01 FR 54710, still be considered to represent NOx RACT for the 8-hour ozone standard for the Mixing -Vessel covers.

II. Manufacturing Group 142 – Rotor Stator Production

Description

The materials processed in this area will be typical of solvent based ink. There are two processing stages involved with this manufacturing group: raw material dispensing and high speed pigment dispersion (using post mixers with rotor stator assemblies rather than radial dispersion blades).

Liquid raw materials for each batch are manually dispensed into the mixing vessel. The mixing vessel is brought to the rotor stator mixer where dry pigment powder is added at a controlled rate. As the mixture is dispersed, the pigment particles are reduced to smaller particle sizes. The rotor stator assembly increases the temperature of the mixture because of the "work" being performed by the mixer blades.

Once the particle size reduction cycle is complete, the vessel is removed from the mixer and is either packaged or further processed through a horizontal mill.

Typically, a wash cycle for the mixer follows batch completion.

The following were considered possible VOC controls: vessel covers; water-cooled vessel covers;condensers with water-cooled vessel covers; Raw Material Dispensing – Transfer Pump & Vapor Vent-Back Line on Mill Discharge Drum.

Evaluation of Proposed Control Systems

1) Raw Material Dispensing – Transfer Pump

The addition of raw materials is conducted manually. Drums of raw material are retrieved from the warehouse, covers are removed and the material is poured into the mixing vessel.

One technique considered for raw material additions includes dispensing from a closed head drum by using a transfer pump instead of the current practice of dispensing from an open drum.

Use of a transfer pump is **technically infeasible** because colored ink concentrate and solvent residues will cling to the inside and outside of the pump, creating potential for contamination of the product. Cleaning of the pump would be required, which would increase net VOC emissions.

2) Vapor Vent-Back Line on Mill Discharge Drum

A vapor vent-back line from the discharge drum back to the feed vessel appears technically infeasible; the productivity will decrease as a result of the increased set-up time for each batch. This technology is technically infeasible.

The following control options are technically feasible:

(a) Vessel Covers
The mixing operation for these manufacturing groups are characterized by short, slow speed mix cycles and therefore are expected to generate a relatively minor amount of VOCs.

(b) Water Cooled Vessel Covers
Water-cooled vessel covers for the mixing stations results in incrementally higher control efficiency.

(c) Condenser and Water-Cooled Vessel Covers
This technology also considered for VOC emission control technology.

Source	Control Technology	Baseline Emission NOx (tpy)	NOx Reduction (%)	NOx Reduction (tpy)	Total Annualized Cost	Cost Effectiveness ($/Ton)
Blends production	Vessel Cover (1 hr RACT)	20.68	77.8	16.09	$10,591	658
Milling (vapor vent back line)	Vessel Cover	0.33	6.8	0.0225	$10,591	470,711
Vessel Clingage	Vessel Cover	0.081	100	0.081	$10,591	130,753
Clean up	Vessel Cover	0.27	16.67	0.045	$10,591	235,356

All of these technologies are determined economically unreasonable. Please see the Appendix for more details on the calculations.

Conclusions and Recommendations:

It is recommended that the 1-hour ozone RACT in the RACT Plan Approval (PA Permit Number 51-2052) dated on July 14, 2000 and approved by EPA as 1-hr RACT on 10/31/01 FR 54710, still be considered to represent NOx RACT for the 8-hour ozone standard for the Mixing -Vessel covers.

III. Manufacturing Group 142-Horizontal Mill Station

Description

There are three processing stages involved with this manufacturing group: raw material dispensing, high speed dispersion, and milling. The raw materials processed in this area will be typical of solvent-based inks.

Generally, the batch will be processed at the rotor stator mixer or conventional post mixer. Liquid raw materials are weighed into a mixing vessel and the vessel is locked in position on the mixer. Pigment powder is added at a controlled rate and the mixture is dispersed until the pigment particle sizes are reduced to a degree acceptable by our quality control standards.

Upon completion of this cycle, the vessel discharge is connected by hose to the horizontal mill inlet. The ink is processed through the mill to further reduce the pigment particle size. The mill discharges into a clean drum which, when full, is sealed and brought to the warehouse for storage.

A wash cycle using a solvent compatible with the prior batch is implemented for the mixer following batch completion. The wash cycle is implemented to prevent color contamination between batches.

The following were considered possible VOC controls: Ra*w Material Dispensing – Transfer Pump;* vessel covers; water-cooled vessel covers; Condenser and Water-Cooled Vessel Covers; Vapor Vent-Back Line on Mill Discharge Drum control technologies are identified;.

Evaluation of Proposed Control Systems

1) Raw Material Dispensing – Transfer Pump

Liquid raw materials for each batch are manually dispensed into the mixing vessel. The mixing vessel is brought to the mixer where dry pigment powder is added at a controlled rate. As the mixture is dispersed, the pigment particles are reduced to smaller particle sizes. The nature of the dispersion blade is such that heat generation is expected to occur.

One technique considered for raw material additions includes dispensing from a closed head drum by using a transfer pump instead of the current practice of dispensing from an open drum.

Use of a transfer pump is **technically infeasible** because colored ink concentrate and solvent residues will cling to the inside and outside of the pump, creating potential for contamination of the product. Cleaning of the pump would be required, which would increase net VOC emissions.

2) Vapor Vent-Back Line on Mill Discharge Drum

A vapor vent-back line from the discharge drum back to the feed vessel appears technically infeasible; the productivity will decrease as a result of the increased set-up time for each batch. This technology is technically infeasible.

The following control options are technically feasible:

(a) Vessel Covers

The permanently mounted non-cooled vessel covers are expected to reduce the emissions by about one third from the uncontrolled conditions. Application feasibility will be affected to the extent that these vessel covers will hinder the addition of pigment to the batch. A chute or similar loading device would need to be provided to accommodate pigment additions. The mixing tanks are required to have covers as required by 1-hour ozone RACT determination. The facility will **continue to use cover for the mixing tanks to meet the 8-hour ozone RACT determination.**

(b) Water-Cooled Vessel Covers

Water-cooled vessel covers represent a more aggressive control measure against VOC emissions.

(c) Condenser and Water-Cooled Vessel Covers

This technology also considered for VOC emission control technology.

Source	Control Technology	Baseline Emission NOx (tpy)	NOx Reduction (%)	NOx Reduction (tpy)	Total Annualized Cost	Cost Effectiveness ($/Ton)
Blends production	Vessel Cover	2.21	35.29	0.78	$13,951	17,886
	Water Cooled Cover	2.21	50.88	1.125	$27,754	24,670
	Water Cooled Cover and Condenser	2.21	50.88	1.125	$44,673	39,709
Vessel clingage	Vessel Cover	0.117	100	0.117	$13,951	119,239
	Water Cooled Cover	0.117	100	0.117	$27,754	237,217
	Water Cooled Cover and Condenser	0.117	100	0.117	$44,673	381,821
Milling (vapor vent back line)	Vessel Cover	1.43	93.18	1.333	$13,951	10,489
	Water Cooled Cover	1.43	93.18	1.333	$27,754	20,868
	Water Cooled Cover and Condenser	1.43	93.18	1.333	$44,673	33,589
Clean up	Vessel Cover	0.39	83.33	0.325	$13,951	42,926
	Water Cooled Cover	0.39	83.33	0.325	$27,754	85,397
	Water Cooled Cover and Condenser	0.39	83.33	0.325	$44,673	137,455

All of these technologies are determined economically unreasonable. Please see the Appendix for more details on the calculations.

Conclusions and Recommendations:

It is recommended that the 1-hour ozone RACT in the RACT Plan Approval (PA Permit Number 51-2052) dated on July 14, 2000 and approved by EPA as 1-hr RACT on 10/31/01 FR 54710, still be considered to represent NOx RACT for the 8-hour ozone standard for the Mixing -Vessel covers.

IV. Manufacturing Group 141 – Ball Mill Production

Description

There are three stages involved with this manufacturing group: raw material additions, milling, and finished product dispensing into drums ready for warehousing.

The ball mill is a sealed cylindrical container which is rotated in its horizontal axis. The function of the ball mill is similar to the horizontal mill previously discussed - to disperse pigment particles. The liquid raw material and dry pigment powder are added via a chute mechanism. Once raw material additions are complete, the ball mill is sealed and the milling cycle is initiated. Upon completion of the milling cycle, the ink product is discharged into drum containers via a discharge pipe.

The following were considered possible VOC controls for *Raw Material Dispensing – Transfer Pump; for* Dispensing of Finished Ink.

Evaluation of Proposed Control Systems

1) Raw Material Dispensing – Transfer Pump

One technique considered for raw material additions includes dispensing from a closed head drum by using a transfer pump instead of the current practice of dispensing from an open drum

Use of a transfer pump is **technically infeasible** because colored ink concentrate and solvent residues will cling to the inside and outside of the pump, creating potential for contamination of the product. Cleaning of the pump would be required, which would increase net VOC emissions.

2) Dispensing of Finished Ink

At completion of the mill cycle, the finished product is dispensed via a constricted opening into a clean drum. The drum is immediately sealed and brought to the warehouse for storage or shipping.

Control equipment was not evaluated for this operation because the facility believes that this operation is currently conducted in its simplest form and no alternative technique nor control equipment could be applied. Therefore control options are **technically infeasible.**

Conclusions and Recommendations:

It is recommended that there is no identified control technology for this source.

V. Manufacturing Group 143 – Kady Mill Production

Description

The Kady Mill operation consists of three stages: raw material addition, high-speed dispersion, and finished product dispensing into drums ready for warehousing.

The Kady Mill is a covered mixing tank with a bottom mounted rotor stator dispersion assembly. The mixing tank is water-jacketed for cooling during the high speed dispersion cycle. The liquid raw material is added via a chute mechanism. Once raw material additions are complete, the milling cycle is initiated.

Upon completion of the milling cycle, the ink product is discharged into drum containers via a discharge pipe.

The following were considered possible VOC controls: *Raw Material Dispensing – Transfer Pump;* vessel covers; water-cooled vessel covers;Condenser; and *Dispensing of Finished Ink* control technologies are identified

Evaluation of Control Systems

The material handling techniques are similar to the Evaluation of Proposal Control Systems for Ball Mill equipment.

1) Raw Material Dispensing – Transfer Pump

One technique considered for raw material additions includes dispensing from a closed head drum by using a transfer pump instead of the current practice of dispensing from an open drum.

Use of a transfer pump is **technically infeasible** because colored ink concentrate and solvent residues will cling to the inside and outside of the pump, creating potential for contamination of the product. Cleaning of the pump would be required, which would increase net VOC emissions.

2) Dispensing of Finished Ink

At completion of the mill cycle, the finished product will be dispensed via a constricted opening into a clean drum. The drum is immediately sealed and brought to the warehouse for storage or shipping.

Control equipment was not evaluated for this operation because the facility believes that this operation is currently conducted in its simplest form and no alternative technique nor control equipment could be applied without generating additional emissions from wash-up solvents required to clean discharge units.

The following options are considered technically feasible:

(a) Vessel Covers

A vessel cover is standard for this equipment. Therefore, an evaluation of this option has not been included in this report. The mixing tanks are required to have covers as required by 1-hour ozone RACT determination. The facility will **continue to use cover for the mixing tanks to meet the 8-hour ozone RACT determination.**

(b) Water Cooled Covers

Water-cooled covers appear technically feasible. Increased condensation rates are anticipated with the use of water cooled vessel covers. .

(c) Condenser and Water-Cooled Vessel Covers

Replacing existing covers with water-cooled covers and a condenser is expected to increase VOC removal efficiency.

Source	Control Technology	Baseline Emission NOx (tpy)	NOx Reduction (%)	NOx Reduction (tpy)	Total Annualized Cost	Cost Effectiveness ($/Ton)
Candy Mills Production	Vessel Cover	2.09	100	2.09	$56,992	27,269
	Water Cooled Cover	2.09	98.9	2.07	$56,992	27,532
	Water Cooled Cover and Condenser	2.09	98.2	2.05	$56,992	27,801
Vessel clingage	Vessel Cover	1.4	100	1.4	$111,316	79,511
	Water Cooled Cover	1.4	100	1.4	$111,316	79,511
	Water Cooled Cover and Condenser	1.4	100	1.4	$111,316	79,511

All of these technologies are determined economically unreasonable. Please see the Appendix for more details on the calculations.

Conclusions and Recommendations:
It is recommended that the 1-hour ozone RACT in the RACT Plan Approval (PA Permit Number 51-2052) dated on July 14, 2000 and approved by EPA as 1-hr RACT on 10/31/01 FR 54710, still be considered to represent NOx RACT for the 8-hour ozone standard for the Mixing -Vessel covers.

Emission Calculations

Process Description			Production Rates		Uncontrolled Emission Factor [a]	Emission Factor Units	Uncontrolled	Covers		Water Cooled Covers		Water Cooled Covers and Condensers	
Manufacturing Group		Process	Maximum Production (lbs/yr)	Estimated Batches			VOC Uncontrolled (lbs)	Emission Factor [a]	VOC Controlled (lbs)	Emission Factor [a]	VOC Controlled (lbs)	Emission Factor [a]	VOC Controlled (lbs)
140	Conventional Blending	Blends Production	6,100,000	-	0.0039	lb VOC/lb ink processed	23,790	0.0025	15,006	0.0022	13,420	0.0020	12,444
		Vessel Clingage	-	15,250	0.3600	lb VOC/ batch	5,490	0.3600	5,490	0.3600	5,490	0.3600	5,490
		Clean Up	-	15,250	1.2	lb VOC/ batch	18,300	1.0	15,250	1.0	15,250	1.0	15,250
		Vessels In Transit	6,100,000	-	0.0001	lb VOC/lb ink processed	610	-	-	-	-	-	-
140	Rotor Stator	Blends Production	450,000	-	0.0919	lb VOC/lb ink processed	41,355	0.0204	9,171	-	-	-	-
		Milling (Vapor Vent Back Line)	150,000	-	0.0044	lb VOC/lb ink processed	660	0.0041	615	-	-	-	-
		Vessel Clingage	-	450	0.3600	lb VOC/ batch	162	0.3600	162	-	-	-	-
		Clean Up	-	450	1.2	lb VOC/ batch	540	1.0	450	-	-	-	-
		Vessels In Transit	450,000	-	0.0003	lb VOC/lb ink processed	135	-	-	-	-	-	-
142	Horizontal Mills	Blends Production	650,000	-	0.0068	lb VOC/lb ink processed	4,420	0.0044	2,860	0.0033	2,171	0.0026	1,671
		Milling (Vapor Vent Back Line)	650,000	-	0.0044	lb VOC/lb ink processed	2,860	0.0041	2,665	0.0041	2,665	0.0041	2,665
		Vessel Clingage	-	650	0.3600	lb VOC/ batch	234	0.3600	234	0.3600	234	0.3600	234
		Clean Up	-	650	1.2	lb VOC/ batch	780	1.0	650	1.0	650	1.0	650
		Vessels In Transit	650,000	-	0.0002	lb VOC/lb ink processed	130	-	-	-	-	-	-
141	Ball Mill	Ball Mills Production	650,000	-	0.0003	lb VOC/lb ink processed	221	0.0003	221	0.0003	221	0.0003	221
143	Kady Mills	Kady Mills Production	8,000,000	-	0.0005	lb VOC/lb ink processed	4,176	0.0005	4,176	0.0005	4,136	0.0005	4,104
		Vessel Clingage	-	2,667	1.1	lb VOC/ batch	2,800	1.1	2,800	1.1	2,800	1.1	2,800
Total (lbs/yr)			16,650,000				106,663		59,750		47,037		45,529
Total (tons/yr)			8,325				53		30		24		23

							Vapor Vent Back Line	
Fugitives	Process	Maximum Production (lbs/yr)	Estimated Batches	Uncontrolled Emission Factor [a]	Emission Factor Units	VOC Uncontrolled (lbs)	Controlled Emission Factor [a]	VOC Controlled (lbs)
Non-process Related Fugitive Emissions	Underground Storage Tanks	7,013,618	-	0.00024	lb VOC/lb ink processed	1,683	0.000024	168
Total (tons/yr)		3,507				0.8		0.1

[a] Emission Factors and production rates were developed for the original 1999 VOC RACT Study. The total production rate was reduced due to removed manufacturing groups. Emissions factors were developed from EPA emission factors using the Emission Master Program, taken from a study conducted by the North American Printing Ink Manufacturer's Association (NAPIM) and an internal material balance investigation approved by AMS.

2014 Cost Summary

Manufacturing Group		Control	Annualized Capital Cost [a]	Added Overtime [b]	Added Operating Cost [b]	Added Clean Up Cost [b]	Total Added Cost [c]
140	Conventional Blending	Mixer Covers	16,456	123,879	-	24,571	164,905
		Water Cooled Covers	27,716	139,364	156,892	24,571	348,543
		Water Cooled Covers and Condensers	42,599	154,848	313,786	49,142	560,375
		Vessels In Transit	393	30,969	-	-	31,362
140	Rotor Stator	Mixer Covers	4,549	4,778	-	1,264	10,591
		Water Cooled Covers	5,476	5,309	6,358	1,264	18,406
		Water Cooled Covers and Condensers	7,161	5,839	12,225	2,527	27,754
		Vessels In Transit	168	1,061	-	-	1,230
		Vapor Vent Back Line on Mill Discharge Drum	2,949	4,601	1,060	-	8,610
142	Horizontal Mill	Mixer Covers	4,549	5,751	-	3,651	13,951
		Water Cooled Covers	5,476	6,902	11,655	3,651	27,682
		Water Cooled Covers and Condensers	7,161	6,902	23,310	7,301	44,673
		Vapor Vent Back	2,949	4,601	1,060	-	8,610
		Vessels In Transit	84	1,150	-	-	1,234
141	Ball Mill	None	-	-	-	-	-
143	Kady Mill	Water Cooled Covers (and Venting Flame Arrestor)	3,229	14,157	35,861	3,745	56,992
		Water Cooled Covers and Condensers (and Venting Flame Arrestor)	3,791	28,316	71,722	7,488	111,316
Non-process Related Fugitive Emissions - Tanks		Vapor Vent Back Line	7,020	-	-	-	7,020

[a] Cost estimates were developed for the original 1999 VOC RACT Study and adjusted to 2014 dollar values. The annualized capital cost includes the cost of the control device and installation, mulitplied by the number of units in each manufacturing group, annualized over five years.

[b] For the original RACT study, a time study was completed for each manufacturing group to determine additional time spent to complete each batch and to clean due to the addition of pollution controls. The study also determined additional costs from cleaning materials and cost of additional water use due to the addition of controls. The additional time required was converted into labor costs. The total added costs were multiplied by batches per year to determine annual added costs due to pollution controls.

[c] Consumer Price Index (CPI) was obtained from Bureau of Labor Statistics 2000 and 2014 Detailed Reports, from Table 1. Consumer Price Index for All Urban Consumers (CPI-U), unadjusted annual average for expenditure category is "All items" and 1982-84=100.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Rahel Gebrekidan

Date: 6/3/2014

Subject: 1997 8-hour ozone RACT Summary for Newman and Company, Inc.

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Newman and Company, Inc. owns and operates a paperboard manufacturing facility located at 6101 Tacony Street, Philadelphia, PA 19135. The facility's air emissions' sources include a 118 MMBTU/hr boiler (Boiler #1), twenty nine space heaters less than 0.5 MMBTU/hr, and two power washers. The facility also has a stage II vapor recovery system for a 3,000 gallon gasoline, a 973,000 BTU/hr fire pump, and a trim waste blower system.

Applicability for NOx RACT:

Newman and Company, Inc is a major source of NOx due to having potential emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT. This facility is not a major source of VOC having potential emissions less than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

The following are NOx emitting units in the facility: one (1) water tube boiler with a maximum heat input rating of 118 MMBTU per hour, firing natural gas as its primary fuel and #6 fuel oil as auxiliary fuel (Boiler #1); twenty-nine (29) natural gas fired space heaters with less 500,000 BTU/hr heat capacity; two (2) natural gas fired power washers with less 500,000 BTU/hr heat capacity; and one (1) 973,000 BTU/hr #2 oil burning fire pump.

EPA Cost Manual, 6th Edition , Jan 2002, Appendix A.2.3

[3]**Electricity cost**: we assume 100 kw@ $0.08/kw-hr for one year. Reference PA DEP RACT State Implementation Plan (SIP) revision, Sep, 2006, page 18; EPA Cost Calculation, Appendix A-NOx Control Analysis, A.1 Vendor Information, A-2 Cost Calculation

[4]From US Bureau of Labor Statics

O [5]**Cost calculations for each elements** are from references: North East States for Coordinated Air Use Management (NESCAUM), EPA' s Office of Air Quality Planning and standards (OAQPS) edition 6, 2002; Cost analysis and engineering economics book (Michael R. Lindeburg), from Facility, and **PADEP Guidelines for RACT SIP revision under the 8-hr Ozone NAAQS, Sep 2006** (Most elements of costs are taken from this doc of page 5 and 18) and from [1]Office of Air Quality Planning and standards (OAQPS) Environmental Protection Agency (EPA) Air Pollution Control Manual, Six Edition, EPA/452/B-02-001, January 2002 (page 2-772, 5-58, 5-59, 5-60, 5-61, 5-13, Appendix A) and other States

Summary of 1-Hour RACT Determination

The Facility has done a RACT analysis in which Boiler #1 was evaluated on a case-by-case basis for the 1-hour ozone standard. As a result of this case-by-case RACT determination, a 1-hour RACT plan approval (permit ID) was approved by AMS (effective on June 6, 1997), and approved in the SIP by EPA on October 30, 2001 (66 CFR 54691).

Emission limits for the 1-hour RACT for Boiler #1 are the following:

- 0.43 lbs/MMBTU when firing #6 oil
- 0.37 lbs/MMBTU when firing natural gas
- Total NOx emissions from the boiler may not exceed 121 tons per rolling 12-month period.

Newman has to demonstrate compliance with the above emission limits by performing stack test every five years.

Case-by-case RACT Analysis:

Union Cogeneration Boiler (Boiler #1)

The following section presents a detailed evaluation of Case-by-Case RACT for boiler#1

The Union Cogeneration boiler (Boiler #1) is a Union Iron Works water tube boiler with a maximum heat input rating of 118 MMBTU per hour. The boiler was installed in 1963 and fires natural gas as its primary fuel. The boiler is also equipped to fire #6 fuel oil, as Newman's contract for natural gas is interruptible at the discretion of the utility.

The boiler is equipped with super heaters to produce superheated steam to a steam turbine which can produce nearly 2 MW of electricity to the Mill.

NOx RACT Option #1 - Flue Gas Recirculation (FGR)

Description of Option

Installation of FGR fan with Variable Frequency Drive (VFD).

The boiler / burner design and offered an

FGR system with 5% FGR to reduce NOx by an estimated 20% when firing natural gas; however, the FGR does not provide a benefit when firing #6 Fuel Oil.

The design involves installing the following equipment and modifications.

- FGR fan with VFD drive. The fan is required to overcome negative pressures in this balanced draft boiler.
- Ductwork to the FGR fan.
- Ductwork from the FGR to the existing Combustion Air Fan (FD Fan), including a manifold on the fan inlet.
- Burner modifications to add a center fired gas gun for flame stability. (The Boiler has three burners to modify)
- A VFD has already been installed on the FD Fan (60 hp)
- VFD and motor for the ID Fan (100 hp).

  Combustion control modifications.

Technical Feasibility:

This project is technically feasible

Economic Feasibility:

Control Technology	Baseline NOx(tpy)	NOx % Reduction	NOx Reduction	Total Annualized	Cost Effectiveness ($/ton)
FGR	**121***	**20**	**24**	**85,535**	**3,564**

Conclusion: ***The FGR is economically unreasonable.***

* Federally enforceable emission limits per RACT NOx limit approved in the SIP by EPA on October 30, 2001.

EPA Cost Manual, 6th Edition , Jan 2002, Appendix A.2.3

[3]**Electricity cost**: we assume 100 kw@ $0.08/kw-hr for one year. Reference PA DEP RACT State Implementation Plan (SIP) revision, Sep, 2006, page 18; EPA Cost Calculation, Appendix A-NOx Control Analysis, A.1 Vendor Information, A-2 Cost Calculation

[4]From US Bureau of Labor Statics

O [5]**Cost calculations for each elements** are from references: North East States for Coordinated Air Use Management (NESCAUM), EPA' s Office of Air Quality Planning and standards (OAQPS) edition 6, 2002; Cost analysis and engineering economics book (Michael R. Lindeburg), from Facility, and **PADEP Guidelines for RACT SIP revision under the 8-hr Ozone NAAQS, Sep 2006** (Most elements of costs are taken from this doc of page 5 and 18) and from [1]Office of Air Quality Planning and standards (OAQPS) Environmental Protection Agency (EPA) Air Pollution Control Manual, Six Edition, EPA/452/B-02-001, January 2002 (page 2[illegible].13, Appendix A) and other States

NOx RACT Option #2 - Feedwater Economizer

Description of Option:	Feedwater Economizer project that would reduce NOx. The project would replace the Air Preheater with a Feedwater Economizer. The decreased Air Temperature would help reduce the thermal NOx by an estimated 40%.
Technical Feasibility:	*This project is considered to be technically infeasible*. The manufacturer does not guarantee results with the installation of the Feedwater Economizer. The manufacturer recommends an additional Boiler Impact Study for $40,000 to determine the effect of this boiler modification and the effect on the boiler superheat. The manufacturer engineers are unsure of the effect of this option on the superheat required for the Turbine generator. Reduced generator efficiency could be the result and boiler efficiency would be reduced by 3%.
Economic Feasibility:	NA
Approximate Cost:	An Economic Feasibility study was not performed due to technical infeasibility. The Boiler Efficiency would be reduced by 3% requiring additional fuel. This project would require approximately $100,000 to $300,000 /yr in additional fuel costs.
Implementation Schedule:	NA
Conclusion	Loss of Boiler Efficiency with the removal of existing Air Preheater. Estimated Boiler efficiency loss is 3%. This project is considered to be technically infeasible.

EPA Cost Manual, 6th Edition , Jan 2002, Appendix A.2.3

[3]**Electricity cost**: we assume 100 kw@ $0.08/kw-hr for one year. Reference PA DEP RACT State Implementation Plan (SIP) revision, Sep, 2006, page 18; EPA Cost Calculation, Appendix A-NOx Control Analysis, A.1 Vendor Information, A-2 Cost Calculation

[4]From US Bureau of Labor Statics

O [5]**Cost calculations for each elements** are from references: North East States for Coordinated Air Use Management (NESCAUM), EPA' s Office of Air Quality Planning and standards (OAQPS) edition 6, 2002; Cost analysis and engineering economics book (Michael R. Lindeburg), from Facility, and **PADEP Guidelines for RACT SIP revision under the 8-hr Ozone NAAQS, Sep 2006** (Most elements of costs are taken from this doc of page 5 and 18) and from [1]Office of Air Quality Planning and standards (OAQPS) Environmental Protection Agency (EPA) Air Pollution Control Manual, Six Edition, EPA/452/B-02-001, January 2002 (page 2-[illegible] 5-[illegible] 5[illegible] 13, Appendix A) and other States

NOx RACT Option #3 - Low NOx/Ultra Low NOx Burner

Description of Option	Low NOx burners (LNB)/Ultra Low NOx Burners. The manufacturer estimated that the new burners could reduce the NOx by 60%. A 60% NOx reduction would equate to a reduction of about 57 Tons per year
Technical Feasibility	*This project is considered to be technically infeasible.* The manufacture does not guarantee results with the installation of the LNB/ULNB to this boiler. The manufacturer recommends an additional Boiler Impact Study for $40,000 to determine the effect of the LNB/ULNB on Flame length and the possible effect on the Boilers Superheat. This boiler was originally designed with a coal grate option. The design of the furnace is shorter and taller than most furnaces designed for oil and natural gas and installing LNB//ULNB burners would further compound an existing issue with the flames impinging on the back wall of the boiler at high firing rates.
Economic Feasibility	An Economic Feasibility study was not performed due to technical infeasibility.
Approximate Cost	NA
Implementation Schedule:	NA
Conclusion;	This project would require extensive changes to the boiler front and require additional down time to install the equipment. This option would require the rental of a temporary boiler to use during the upgrade of the boiler front. Also included are additional electrical charges as the turbine will not be available for use with the rental boiler. The rental boiler will only be able provide process steam and not superheated steam for turbine generator use and thus, *this project is considered to be technically infeasible*

Conclusion

AMS has determined that the installations of the above control technologies are *technically/economically infeasible* and thus the approved 1-hour RACT determination for NOx emissions will remain NOx RACT for this boiler. The facility will maintain the NOx emission limits not to exceed 0.43 lbs/MMBTU when firing #6 oil and 0.37 lbs/MMBTU when firing

EPA Cost Manual, 6th Edition , Jan 2002, Appendix A.2.3

[3]**Electricity cost**: we assume 100 kw@ $0.08/kw-hr for one year. Reference PA DEP RACT State Implementation Plan (SIP) revision, Sep, 2006, page 18; EPA Cost Calculation, Appendix A-NOx Control Analysis, A.1 Vendor Information, A-2 Cost Calculation

[4]From US Bureau of Labor Statics

O [5]**Cost calculations for each elements** are from references: North East States for Coordinated Air Use Management (NESCAUM), EPA' s Office of Air Quality Planning and standards (OAQPS) edition 6, 2002; Cost analysis and engineering economics book (Michael R. Lindeburg), from Facility, and **PADEP Guidelines for RACT SIP revision under the 8-hr Ozone NAAQS, Sep 2006** (Most elements of costs are taken from this doc of page 5 and 18) and from [1]Office of Air Quality Planning and standards (OAQPS) Environmental Protection Agency (EPA) Air Pollution Control Manual, Six Edition, EPA/452/B-02-001, January 2002 (page 2-72 & 5-71 - 5-74 Table 5.13, Appendix A) and other States

natural gas, the total NOx emissions limit of 121 tons per rolling 12-month period, and all relevant monitoring and recordkeeping requirements. AMS recommends that the 1-hour ozone RACT determination, dated June 11, 1997 and SIP-approved by EPA on October 30, 2001 still be considered to represent NOx RACT for the 1997 8-hour ozone standard for Boiler #1.

Presumptive RACT Sources

The following sources meet the various presumptive RACT emission limitations and criteria specified in 25 Pa. Code 129.93.

Table 1-1 lists sources that meet the presumptive RACT requirements specified in 25 Pa Code 129.93(c), operation and maintenance of boilers per manufacturer specifications, which are the following: the 29 space heaters and the 2 power washers.

Table 1-1 *Small space heaters*

Source	Capacity	Fuel Type
Building No. 6 Space Heater 1	400,000 BTU/hr	natural gas
Building No. 6 Space Heater 2	400,000 BTU/hr	natural gas
Building No. 6 Space Heater 3	400,000 BTU/hr	natural gas
Building No. 6 Space Heater 4	400,000 BTU/hr	natural gas
Building No. 6 Space Heater 5	400,000 BTU/hr	natural gas
Building No. 6 Space Heater 6	400,000 BTU/hr	natural gas
Truck Shop Space Heater	<500,000 BTU/hr	natural gas
Truck Shop Space Heater	<500,000 BTU/hr	natural gas
Truck Shop Space Heater	<500,000 BTU/hr	natural gas
Truck Shop Space Heater	<500,000 BTU/hr	natural gas
Office Heater	<500,000 BTU/hr	natural gas
Shop Space Heater	<500,000 BTU/hr	natural gas
Powerhouse Space Heater	<500,000 BTU/hr	natural gas
Garage Space Heater	<500,000 BTU/hr	natural gas
Garage Space Heater	<500,000 BTU/hr	natural gas
Office Water Heater	<500,000 BTU/hr	natural gas
Mill Water Heater	<500,000 BTU/hr	natural gas
Mill Water Heater	<500,000 BTU/hr	natural gas
Power Washer - Shop	<500,000 BTU/hr	natural gas
Power Washer - Powerhouse	<500,000 BTU/hr	natural gas
USC Building Space Heater 1	<500,000 BTU/hr	natural gas
USC Building Space Heater 2	<500,000 BTU/hr	natural gas
USC Building Space Heater 3	<500,000 BTU/hr	natural gas
USC Building Space Heater 4	<500,000 BTU/hr	natural gas
Skid Shop Space Heater 1	<500,000 BTU/hr	natural gas
Skid Shop Space Heater 2	<500,000 BTU/hr	natural gas

EPA Cost Manual, 6th Edition , Jan 2002, Appendix A.2.3

[3]**Electricity cost**: we assume 100 kw@ $0.08/kw-hr for one year. Reference PA DEP RACT State Implementation Plan (SIP) revision, Sep, 2006, page 18; EPA Cost Calculation, Appendix A-NOx Control Analysis, A.1 Vendor Information, A-2 Cost Calculation

[4]From US Bureau of Labor Statics

O [5]**Cost calculations for each elements** are from references: North East States for Coordinated Air Use Management (NESCAUM), EPA' s Office of Air Quality Planning and standards (OAQPS) edition 6, 2002; Cost analysis and engineering economics book (Michael R. Lindeburg), from Facility, and **PADEP Guidelines for RACT SIP revision under the 8-hr Ozone NAAQS, Sep 2006** (Most elements of costs are taken from this doc of page 5 and 18) and from [1]Office of Air Quality Planning and standards (OAQPS) Environmental Protection Agency (EPA) Air Pollution Control Manual, Six Edition, EPA/452/B-02-001, January 2002 (page 2[illegible] 5[illegible] 5[illegible] 5[illegible] 5[illegible] 13, Appendix A) and other States

Skid Shop Space Heater 3	<500,000 BTU/hr	natural gas
Truck Shop Water Heater	<500,000 BTU/hr	natural gas
Building No. 6 Furnace	<500,000 BTU/hr	natural gas
USC Building Space Heater 5	<500,000 BTU/hr	natural gas
USC Building Boiler 1	<500,000 BTU/hr	natural gas

Table 1-2 identifies the presumptive RACT requirement specified in 25 Pa Code 129.93(c)(5) [operation and maintenance of engines per manufacturer specifications and use limited to 500 hours per year or less], that applies to the 973,000 BTU/hr fire pump.

Table 1-2 *Fire Pump*

Source	Capacity	Fuel Type
Ferman Warehouse Fire Pump	973,000 BTU/hr	#2 Oil

EPA Cost Manual, 6th Edition , Jan 2002, Appendix A.2.3

[3]**Electricity cost**: we assume 100 kw@ $0.08/kw-hr for one year. Reference PA DEP RACT State Implementation Plan (SIP) revision, Sep, 2006, page 18; EPA Cost Calculation, Appendix A-NOx Control Analysis, A.1 Vendor Information, A-2 Cost Calculation

[4]From US Bureau of Labor Statics

O [5]**Cost calculations for each elements** are from references: North East States for Coordinated Air Use Management (NESCAUM), EPA' s Office of Air Quality Planning and standards (OAQPS) edition 6, 2002; Cost analysis and engineering economics book (Michael R. Lindeburg), from Facility, and **PADEP Guidelines for RACT SIP revision under the 8-hr Ozone NAAQS, Sep 2006** (Most elements of costs are taken from this doc of page 5 and 18) and from [1]Office of Air Quality Planning and standards (OAQPS) Environmental Protection Agency (EPA) Air Pollution Control Manual, Six Edition, EPA/452/B-02-001, January 2002 (page 2.2.7, 2.5.5, 7.1.52 table 1.13, Appendix A) and other States

Appendix

Table 1 Economic Calculations for FGR

Total capital Cost			
Total Capital Investment Cost (TCI)	**$**	295,000	TCI includes equipment cost estimates from Coen Company. Installation costs and additional equipment including ID Fan motor, VFD, duct work piping and electrical installation are supplied by estimate or similar project experience at the facility. CPI adjusted.
Annual Operating Costs			
Direct Annual Cost			
Electricity Cost[3]	$	$17,520	20kw @ $0.10/kwh, 8760 hrs/yr
Operator[4]	$	8,213	0.25 hr/shift, 3 shift/day, $30/hr
Supervisor[4]	$	1,232	15% of Operator
Maintenance[4]	$	4,000	
Material[4]	$	4,000	100% of Maintenance
Total Direct Annual Cost	**$**	34,964	
Indirect Annual Cost			
Overhead[4]	$	2,400	60% of maintenance-OAQPS[1]
Administrative Charge[4]	$	5,900	2% of TCI-OAQPS[1]
Property Taxes[4]	$	2,950	1% of TCI-OAQPS[1]
Insurance[4]	$	2,950	1% of TCI-OAQPS[1]
Capital Recovery	$	36,371	10 yrs @ 4% -
Total Indirect Annual Cost	**$**	50,571	
Total Annual Operating Costs	**$**	85,535	
NOx Emission Reduction (TPY)		24	121 TPE * 20% Reduction
Cost Effectiveness ($/ton NOx removed)	**$**	3,564	

EPA Cost Manual, 6th Edition , Jan 2002, Appendix A.2.3

[3]**Electricity cost**: we assume 100 kw@ $0.08/kw-hr for one year. Reference PA DEP RACT State Implementation Plan (SIP) revision, Sep, 2006, page 18; EPA Cost Calculation, Appendix A-NOx Control Analysis, A.1 Vendor Information, A-2 Cost Calculation

[4]From US Bureau of Labor Statics

O [5]**Cost calculations for each elements** are from references: North East States for Coordinated Air Use Management (NESCAUM), EPA' s Office of Air Quality Planning and standards (OAQPS) edition 6, 2002; Cost analysis and engineering economics book (Michael R. Lindeburg), from Facility, and **PADEP Guidelines for RACT SIP revision under the 8-hr Ozone NAAQS, Sep 2006** (Most elements of costs are taken from this doc of page 5 and 18) and from [1]Office of Air Quality Planning and standards (OAQPS) Environmental Protection Agency (EPA) Air Pollution Control Manual, Six Edition, EPA/452/B-02-001, January 2002 (page 2-27/2.5.5.1-53 table 1.13, Appendix A) and other States

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Kassahun Sellassie

Date: September 04, 2014

Subject: 1997 8-Hour RACT Analysis for Exelon Generating Company - Southwark Station

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of the reevaluation of NOx RACT for the 1997 8-hour ozone standard for this facility

Company Description:

Exelon (formerly PECO) - Southwark Station owns and operates an electric utility in Philadelphia, Pennsylvania. Equipment currently used at the facility includes four simple cycle combustion turbines. The facility was owned by PECO Energy Company at the time of the 1-hour RACT plan approval, but changed to ownership to Exelon in October 2000.

Applicability for NOx and VOC RACT:

Exelon - Southwark Station is a major source of NOx due to having potential NOx emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone NAAQS. They are not a major source of VOC, due to having potential VOC emissions not greater than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone.

Process Descriptions:

Exelon - Southwark Station currently has four combustion turbines rated 15.5 MW. All units burn #2 oil. These are the only NOx emission sources at the facility.

NOx RACT Analysis for the 1997 8-hour Ozone Standard:

Each combustion turbine accepted a 5% annual capacity factor in the 1-hour RACT determination dated July 11, 2001 and is covered under the presumptive RACT limitations of 25 PA Code Section 129.93(c)(5). Therefore, the combustion turbines are covered by Pennsylvania's presumptive RACT. No further analysis is needed for 8-hour RACT.

Conclusions and Recommendations:
It is recommended that the 1-hour ozone RACT determination dated July 11, 2001 still be considered to represent NOx RACT for the 1997 8-hour ozone standard for the Exelon - Southwark Station.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Biji Pandisseril

Date: March 18, 2014

Subject: 8-Hour RACT Analysis for Naval Surface Warfare Center Cardrock Division (NSWC) (PLID # 09724)

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of VOC and NOx. Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

NSWCCD (formerly NAVSSES) is a Naval research and development facility located in Philadelphia, Pennsylvania. Equipment used at the facility includes boilers and heater, emergency generators and fire pumps, diesel engines, test cell engines and gas turbines, paint spray booth with dry filters, and wood wording shop with baghouse.

Applicability for NOx and VOC RACT:

NSWCCD is a major source of Nitrogen Oxides (NOx) having potential NOx emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT 8-hour ozone NAAQS. The facility is a minor source of Volatile Organic Compounds (VOC) having potential VOC emissions of less than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT 8-hour ozone NAAQS.

Process Descriptions:

Source Inventory:

Combustion units.

Bldg 633 - 202 MMBTU/hr wall-fired ship's boiler (DDG-15)
Twenty (20) new small boilers/heaters each less than 10 MMBTU/hr

Following combustion units that were included in the original 1 hour RACT analysis but are now removed and not included in the facility's Title V operating permit:

Bldg 519 - Two (2) 244 MMBTU/hr wall-fired ship's boilers (DDG-37 & CG-32)
Bldg 633 - 317 MMBTU/hr wall-fired Baltimore ship's boiler (No.3).
Bldg 633 - 384 MMBTU/hr wall-fired ship's boiler (CVA-60)
Bldg 633 - 6.95 MMBTU/hr combustion test facility with one burner.
Bldg 633 - Vapor Boiler with 2.176 MMBTU/hr saturated steam generator and 0.6 MMBTU/hr superheater
Bldg 781 - 2.58 MMBTU/hr boiler that provides space heating for Bldg 781 & 782.

Emergency Units

B77H 268 bhp diesel fired Emergency Generator
B4 88 bhp natural gas fired Emergency Generator G1

B4 154 bhp natural gas fired Emergency Generator G2
B29 54 bhp natural gas fired Emergency Generator
B1000 186 bhp natural gas fired Emergency Generator
B485 208 hp diesel fired Fire Pump
B485 208 hp diesel fired Fire Pump
B542 115 hp diesel fired Fire Pump

Following emergency units that were included in the original 1 hour RACT analysis but are now removed and not included in the facility's Title V operating permit:
One 20 kW diesel fired Emergency Generator
One 25 kW diesel fired Emergency Generator
Two 2.25 kW gasoline fired Emergency Generator
Two 5 kW gasoline fired Emergency Generator
One 6.5 kW gasoline fired Emergency Generator

Engines and Turbines
B77H 16.42 MMBTU/hr Marine Engine Test Cell 1
B77H 206.9 MMBTU/hr Engine Testing Gas Turbine DDG51 (LM-2500A)
B77H 206.9 MMBTU/hr Engine Testing Gas Turbine DDG51 (LM-2500B)
B77H 40.6 MMBTU/hr Engine Testing Gas Turbine CG-47 (K-17)
B77H 37.4 MMBTU/hr Engine Testing Gas Turbine GTG#2 (K-34)
B633 51.2 MMBTU/hr Engine Testing LSD-41 ALPHA
B633 51.2 MMBTU/hr Engine Testing LSD-41 Bravo
B633 ≤ 42.1 MMBTU/hr Engine Testing TF-40 Gas Turbine Test Cell 2
B77H 37.4 MMBTU/hr Engine Testing Gas Turbine GTG#1 (K-34)
B77H 4.72 MMBTU/hr Engine Testing Gas Turbine Auxiliary (RIMMS)
B87 2.56 MMBTU/hr Engine Testing Diesel Generator
B633 238 MMBTU/hr P-104 Test Cell
B77H 311.8 MMBTU/hr DD(X) MT-30
B77H 51.4 MMTU/hr DD(X) LM-500
B77H 55.6 MMTU/hr DD(X) RR-4500
DDX Test Cell 418.8 MMTU/hr
B87 80 kW Caterpillar D80-4 Test Engine Generator
B77H 4.79 MMBTU/hr Diesel Engine Testing EDG, CAT C-18

Following turbines and test cell that were included in the original 1 hour RACT analysis but are now removed and not included in the facility's Title V operating permit:
824 TF 40 Gas Turbine Test Cell 1
824 T-62 gas turbine part of small and medium Gas Turbine Test Facility
B14 Six(6) Test Cells
B14 One (1) Test Cell

Analysis

NSWCCD is the research and development facility and are required to equip and operate their sources like their shipboard or submarine counterparts to an effective test platforms. Including control technology would change their mentioned of operation, therefore control technologies are technically infeasible for B633 DDG-15 boiler and all turbines tested in the test cell and their engines.

The B633 DDG-15 boiler, diesel engines, and gas turbine will continue to adhere to the standard Navy Planned Maintenance program as defined for shipboard use.

Presumptive RACT:
In accordance, with 25 PA Code 129.93 (a) the facility will comply with presumptive RACT limitations.

Each small boiler/heater will comply with the presumptive RACT of 25 PA Code 129.93(c)(1). The emergency units (emergency generators and fire pumps) will comply with 25 PA Code 129.93(c)(5).

No further analysis is needed for 8-hour RACT.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Rahel Gebrekidan

Date: August 3, 2014

Subject: RACT Modification Summary for Temple University – Health Sciences Campus

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8 hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Temple University – Health Sciences Campus is located at 3401 North Broad Street, Philadelphia, PA 19140. The facility's air emission sources include three each 76.4 MMBTU/hr boiler, two <2 MMBTU/hr boilers, and 20 emergency generators and fire pumps. The facility included a medical waste incinerator, but the unit was removed in 2008.

Applicability for NOx and VOC RACT:

Temple University – Health Sciences Campus is a major source of NOx due to having potential NOx emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT. This facility is not a major source of VOC having potential VOC emissions less than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

Summary of the 1-hour Case-By-Case RACT determination
The Facility did a RACT determination for the 1-hour ozone standard in December, 1999 which was approved by EPA on 10/31/2001. Boilers 1, 2, 3 were evaluated for NOx and as a result the following emission limits were approved as RACT.
The 1-hour RACT also includes a medical waste incinerator, and the unit has been removed from the facility in 2008.

Case-by-Case RACT Analysis:

The three Central Steam Plant (CSP) Boilers (Boilers 1, 2, and 3) are each Keeler CP units with heat input 76.4 MMBTU/hr, are allowed to combust both natural gas and #6 fuel oil, and have a common stack. These units were originally installed in 1967 and were evaluated for NOx RACT for the 1-hour ozone standard. As a result of the 1-hour RACT determination, the following requirements were approved as RACT:

- Boiler #2 to utilize flue gas recirculation and low excess air combustion (FGR).
- Boilers #1 and #3 to have fuel flow governing devices limiting the fuel input to 50 MMBTU/hr each, making them applicable to the presumptive RACT requirements of 25 PA Code Section 129.93(b)(2).

However, after the RACT plan approval was issued, Temple Health discovered that installing the FGR was technically infeasible for Boiler #2. The FGR was not possible due to a number of issues that were specifically encountered by Temple when attempting to engineer the application of FGR on Boiler #2. Achieving effective NOx control with FGR requires accurate and repeatable control of combustion air temperature and oxygen content. This was not possible with these boilers because they are field-erected, balanced draft type with negatively pressurized, cross-drafted furnaces and relatively large exhaust breechings. As such the velocity of the flue gases leaving the boiler is very low most of the time. Low flue gas velocity in the breeching causes stratification of combustion gases with ambient air which, by design, is drawn in through openings at the front of the boiler and across the top of the boiler to purge potentially unburned gases from that otherwise stagnant zone (hence the term, "cross-drafted"). This deliberate cross-drafting coupled with the leakage of ambient air through the boiler casing and loosely stacked brick refractory walls makes repeatable flue gas extraction impossible at anything less than 80% of full load when the flue gas velocities are high enough to achieve thorough mixing of the combustion gases with ambient air in the breeching (a point that would never be reached as long as all three boilers in the plant are available). Combustion air temperature affects air density and, therefore, the air fuel ratio which in turn affects boiler efficiency and NOx production. Combustion air temperature on these boilers varies due to the fact that combustion air travels from the fan through a waffle-like pathway of terracotta blocks under the furnace floor and into a common windbox at the front of the boiler where it is drawn through registers into all three burners. At low loads the air's residence time under the furnace floor allows it to pick up enough heat to rise as much as 200 degrees F in temperature.

Unfortunately, this temperature change is not consistent or predictable. It varies with outside air temperature, boiler load and the length of time that the boiler has been on line and off line. With no way to control combustion air temperature air flow measurement becomes a critical requirement for reliable combustion control.

The boilers presently operate with a single-point positioning system circa 1966 for combustion control which would have to be replaced in an FGR retrofit with a fully-metered system using direct and continuous measurements of fuel, air and flue gas flow to control combustion. However, due to the heating problem cited above, air flow measurement is complicated by the variable density of the combustion air. Exacerbating the problem of air flow measurement is the boilers' characteristic, unalterable, low combustion air velocity which makes metering instruments that depend on pressure drop, positive displacement or vortex shedders impossible. An FGR retrofit on these boilers is also complicated by the fact that all three burners on each boiler share a common windbox. Uniform mixing and distribution of the flue gas to each one of the three burners cannot be done with a common windbox. The original FGR retrofit designed by Benz Air discussed in the 1994 RACT analysis was fatally flawed because it failed to address this problem.

The combined combustion control retrofit, including FGR, proposed in ERM's 2006 RACT analysis (the "X-Plus" system designed by Preferred Utilities) addressed this problem by providing two separate windboxes and burners with independent controls. This FGR-capable burner design has never been proven in practice with FGR and the vendor readily admits that only three or four of these combustion systems have ever been installed, none of which are presently using FGR.

Another reason why an FGR retrofit of these boilers is technically infeasible is acid precipitation.

Flue gas from #6 oil combustion forms strong acids when the gas temperature falls below the dewpoint. Injecting flue gas at the combustion fan (as Benz proposed) would result in acid precipitation in the ductwork between the fan and the terracotta airway under the furnace. Even stainless steel ductwork and epoxy coatings have failed in a few short years of operation when exposed to flue gas acid. Injecting flue gas at the windbox (as in the X-Plus design) avoids the problems upstream between the windbox and the fan but does not eliminate windbox corrosion and, again, the benefit of this design has never been proven in practice.

The final reason why FGR is not technically feasible on these boilers is perhaps the most significant. These boilers have an unusually short furnace which is why they include three burners to spread a broad short flame that does not impinge on the furnace walls. The flame pattern with FGR is characteristically elongated, so much so that it would impinge on the boiler walls causing high CO emissions, soot buildup and high opacity.

Based on the significant technical issues in installing a FGR retrofit system, FGR was considered technically infeasible.

Temple also had difficulty maintaining the 50 MMBTU/hr capacity limits on Boilers #1 and #3 due to past and planned future expansion of the campus. As a result, Temple has proposed to modify the RACT requirements for the boilers.AMS had issued a RACT Plan approval for the following modification; however the modification has never made it to the SIP revision.

1 hour RACT Modification

Temple's RACT modification proposal

1. Modify RACT Plan Approval requirements for Keeler Boilers #1 and #3 to replace the requirement for a fuel governing device limiting each boiler to 50 MMBTU/hr with a requirement for Combustion Components Associates (CCA) burner modifications for each boiler.
2. Modify the RACT Plan Approval requirement for Keeler Boiler #2 to replace the requirement to utilize flue gas recirculation and low excess air combustion with a requirement for CCA burner modifications.

The followings are the result of the modification

1. Nitrogen Oxides (NOx)emissions from each boiler shall not exceed the following
   (a) 0.067 lbs/MMBTU while burning natural gas.
   (b) 0.40 lbs/MMBTU while burning No.6 fuel oil
   (c) Nitrogen Oxides (NO_x) emissions from Boilers #1, #2, and #3 combined shall not exceed 56.3 lbs/hr.
2. The combined heat input for Boilers #1, #2, and #3 shall not exceed 673,894 MMBTU per rolling 12-month period.
3. CCA burner modifications shall be performed on each boiler, including each of the following:
   (a) Installation of staged flame stabilizers (a.k.a. swirlers).
   (b) Redesign and replacement of the atomizers.
   (c) Replacement of the center-fired gas injection rings with gas manifolds

having center-fired and poker gas injection.

(d) Installation of a NO_x tempering system (water injection).

The proposed combustion modification and NOx emission limits reduces the hourly limits by about 30% and annual NOx emission by about 50% of the 1-hour RACT approved limits.

The following table provides an emission comparison between the 1-hour RACT requirements and the proposed modification.

Emission comparison between the 1-hour RACT and the proposed modification

Pre-Change Emission (1 hr Approved RACT)				Comment
	Boiler # 1	**Boiler #2 with FGR**	**Boiler # 3**	
Capacity (MMBTU/Hr)	50	76.4	50	1-hour RACT requires boiler #1&3 to capacity to be reduced to 50MMBTU/hr and boiler #2 to have FGR.
Emission Factor (lb/mmbtu)	0.51*	0.363*	0.51*	*EF from AP-42 Table 1.3-1, footnote d (((20.54+104.39*N)/1000)/X) *(1-0.3) lbs/MMBTU,* while N=0.55%, Temple's worst case N content and X=0.15MMBTU/gal Standard
Emissions (lb/hr)	25.98*	27.793*	25.98*	
Emissions (tpy)	113.8	121.73	113.8	
Combined Emission (lb/hr)	**79.76****			
Combined Emission (tpy)	**349.36****			

Post-Change Emission (Proposed Modification RACT)

	Boiler # 1	**Boiler #2**	**Boiler # 3**	
Capacity (MMBTU/Hr)	76.4	76.4	76.4	
Emission Factor (lb/mmbtu)	0.4***	0.4	0.4	*EF from AP-42, 0.25 + (0.073059/.15* (.55-0.25)),* while N=0.55%, Temple's worst case N content and X=0.15MMBTU/gal Standard, and reduced the AP-42 emission by 30%
Emissions (lb/hr)	30.56	30.56	30.56	
Emissions (tpy)	133.8	133.8	133.8	
Combined Emission (lb/hr)	**56.3**			Proposed limit

Combined Emission (tpy)	**134.7******			*Based on the proposed combined heat input limits of 673,894 MMBTU/rolling 12 month and 0.40lb/MMBTU NOx emission limit for #6 fuel oil.*
Change				
Emissions (lb/hr)	4.5	2.7	4.5	
Emissions (tpy)	20.0	12.1	20.0	
Combined Emission (lb/hr)	-23.4			
Combined Emission (tpy)	-214.5			From a baseline emission of 349.36 tpy of 1-hour RACT

**There was no lb/hr or lb/MMBTU limits existed for the 1-hour RACT, this was only for comparison and the emission factor is from AP-42. For Boiler #2 the AP-42 emission factor is reduce by 30% for FGR (AP-42 Table 1.3-14)*
***If Temple had installed the FGR for boiler #2 and reduced boiler #1 and #3 capacities to 50MMBTU/hr*
*** Converted to account for BTU content, the 30% reduction is comparable to installation of FGR

In addition to the overall emission reduction per rolling twelve month period and the hourly emission limits, the proposed RACT modification includes the 56.3 lbs/hr combined NOx hourly limit for each boiler and, a combined heat input limits of 673,894 MMBTU/rolling 12 month. Since the proposed emission limit is more stringent than the currently approved 1-hour RACT, AMS is requesting EPA to approve these changes to RACT requirements as a SIP revision.

Case-by-Case RACT Analysis.
In order to show that the proposed modification represents RACT, this updated Case-by-Case RACT analysis will evaluate further emissions reductions from the installation of additional controls in each of the boilers.
- Selective catalytic reduction (SCR)
- Selective non-catalytic reduction (SNCR)
- Combustion System Modifications for Ultra-Low NOx Performance
- Fuel Switching from No.6 to No.2
-Fuel switching to 100% natural gas

Detail analysis for each emission control technology is shown below:

Selective Catalytic Reduction (SCR):
The HSC-CSP boilers could theoretically be equipped with SCR systems for NOx control; however, a number of significant issues would need to be addressed to deem SCR a technically feasible alternative.
There are physical size limitations for the SCR installation for the boilers. Because of the large size requirements of an SCR system and the lack of available space in the Central Steam Plant, SCR installation would require major modifications to the existing flue and ductwork design. The ductwork would need to be directed outside the existing building, where the catalytic reactor would theoretically be housed, and then re-directed back inside the building to the downstream components. Additionally, any burning particles would have the potential to severely damage the catalyst. Finally, new fans to accommodate the greater pressure drop associated with the redesigned system would be required. The installation of SCR would impact the efficiency of the

existing boilers, such that additional fuel would be required in order to achieve the same level of steam output currently recognized, in other words there would be an energy penalty associated with the use of SCR. In addition, the use of residual fuel oil renders SCR a marginally available technology, due to the presence of "soot" in the flue gas that has the tendency to plug the catalyst without additional equipment modification.

Although the space availability in the Central Steam Plant is extremely limited to house an SCR unit which would be able to treat the flue gas for the boilers, SCR is considered a technically feasible option for the CSP boilers.

Selective Non-Catalytic Reduction (SNCR)

SNCR systems require relatively high gas operating temperatures. Steady temperatures in the range of 1,600 to 2,000°F are required to operate an SNCR system effectively. The Temple boilers (as with most commercial boilers) experience variations in load, and therefore temperatures will change frequently, making it difficult to maintain temperature ranges suitable for an SNCR system.

An additional concern with the theoretical application of SNCR to the Temple boilers relates to ash management. With SNCR, proportionally more ammonia or urea is injected for additional NOx control. With excessive ammonia, however, there is a potential for ammonia to condense onto to the fly ash. Fly ash contamination severely restricts ash management options. While physical size requirements are not as significant a concern with SNCR as compared to SCR, there are size limitations that would need to be addressed for the CSP boilers as addressed above for the SCR system. As with SCR, the installation of SNCR would impact the efficiency of the existing boilers, such that additional fuel would be required in order to achieve the same level of steam output currently recognized (i.e., energy penalty).

SNCR is not considered a technically feasible option for the CSP boilers due to the fluctuating temperatures resulting from operation of the boilers, as well as the physical space availability constraints to house the necessary components of an SNCR system.

Combustion System Modifications for Ultra-Low/Low NOx burner Performance

Ultra Low-NOx burners can achieve NOx flue gas concentrations of 9 - 15 ppm through a combination of different burner modifications. A survey of companies that provide ultra low NOx burner retrofit technologies (Cleaver-Brooks, Alzeta Corporation, JLCC, Inc., John Zink Corporation) to determine what modifications were needed in addition to the burner replacement. In each case, some measure of flue gas recirculation (FGR) is required. The LNB manufacturers use the concept of internal flue gas recirculation to lower the flame temperature and reduce NOx formation. The LNB manufacturers sometimes refer to this hybrid technology as Ultra Low NOx Burners (ULNBs). ULNBs may be used only in bottom-fired, natural draft units. Unfortunately, ULNBs perform poorly on air pre-heated and wall-fired systems. Eliminating air pre-heat for ULNB applications not only increases the installation cost; it also increases operating costs due to the need for additional fuel to replace the air pre-heat. Field experience indicates that modifying the air pre-heater ductwork is challenging. ***It is extremely difficult to attain previous fuel efficiency and combustion performance with air pre-heater modifications***. ***Most combustion experts agree that once the air pre-heater is removed, the combustion unit never returns to its original performance!*** Units modified in such a fashion have often required re-tubing, or even furnace replacement, to return to its previous performance. Replacing air preheater with an economizer to merely deal with NOx emissions or to install LNB is a very expensive and unnecessary proposition. The most cost-effective approach for reducing NOx from air-preheated systems is by flue gas recirculation (FGR). In the FGR NOx control process, a portion of the exhaust flue gas is recycled back into the combustion air stream.

In the case of the HSC-CSP boilers, FGR is not possible due to a number of issues that were specifically encountered by Temple which is discussed above.

Fuel Switching from No.6 to No.2 fuel oil

In order for the boilers to burn distillate fuel oil, each boiler would require a complete burner replacement. Based on reliability concerns and Joint commission on accreditation of health care organizations requirements, primary and backup fuels are required for steam utilities servicing an accredited hospital. Therefore, the only fuel switching available to the HSC Boilers is a switch from #6 fuel oil to #2 fuel oil. Temple deemed fuel switching to be a technically feasible option.

The NOx emission reduction for a given system configuration from #6 fuel oil to #2 fuel oil is approximately 65% (#6 Fuel oil at 0.3%-0.4%, #2 Fuel Oil <0.001%). The majority of the NOx emissions reduction is due to the reduction in fuel-bound nitrogen.

Fuel Switching to 100% Natural Gas

Temple Health is a Joint Commission-certified healthcare facility. Under Joint Commission standards, the facility must have backup fuel available in order to prevent loss of use of life-critical equipment should the primary fuel supply be interrupted for any reason.

In order to implement this scenario, Temple would be required to:

- Upgrade the contracted supply of natural gas from interruptible service to firm service; and
- Ensure that the supply has no potential for interruption, due to Joint Commission requirements.

Temple has no operational control regarding the availability of natural gas at any given time. The "firm" natural gas supply does not provide assurance that natural gas will be available to Temple 100% of the time.

Temple considers this scenario to be technically infeasible for the following reasons:

1. Temple cannot guarantee natural gas availability to burn in the boilers 100% of the time.
2. If natural gas becomes unavailable, Temple must, under Joint Commission standards, run an alternative fuel (#6 oil). If an enforceable condition of 100% natural gas is imposed, a gas service curtailment initiated by PGW pursuant to their own Rules and Regulations would result in a violation of the RACT for Temple. Temple considers switching to 100%natural gas to be technically infeasible.

The following NOx controls were determined technologically feasible for the Boilers: SCR and fuel switching. A summary of the cost-effectiveness of each control option is provided below.

Source	Control Technology	Baseline NOx (tpy)	NOx Reduction (%)	NOx Reduction (tpy)	Total Annualized Cost	Cost Effectiveness ($/Ton)
CSP Boilers (combined)	SCR	134.77	80	107.8	$326,072	3,024
	Fuel switching from No.6 to No.2 fuel oil	134.77	65	87.6	$3,048,568.10	34,801

The above controls are determined *economically unreasonable* because their respective cost-effectiveness is above $2,500/ton, which AMS has determined as the threshold for economic feasibility.

For more detailed calculations, please see Appendix.

Conclusions and Recommendations:

AMS recommends that the modification to the RACT requirements for the three Central Steam Plant (CSP) Boilers described above be made to the 1-hour RACT. Also, AMS recommends that this update to the 1-hour RACT represents RACT for the 1997 8-hour standard. AMS has determined that the following emission limitations and work practice standard represent NOx RACT for these boilers;

1. Nitrogen Oxides (NOx) emissions from each boiler shall not exceed the following
   (a) 0.067 lbs/MMBTU while burning natural gas.
   (b) 0.40 lbs/MMBTU while burning No.6 fuel oil
   (c) Nitrogen Oxides (NO_x) emissions from Boilers #1, #2, and #3 combined shall not exceed 56.3 lbs/hr.
2. The combined heat input for Boilers #1, #2, and #3 shall not exceed 673,894 MMBTU per rolling 12-month period.
3. CCA burner modifications shall be performed on each boiler, including each of the following:
   (a) Installation of staged flame stabilizers (a.k.a. swirlers).
   (b) Redesign and replacement of the atomizers.
   (c) Replacement of the center-fired gas injection rings with gas manifolds having center-fired and poker gas injection.
   (d) Installation of a NO_x tempering system (water injection).
4. During the ozone season; between (May 1 – September 30), each boiler shall burn natural gas as the primary fuel. Each boiler may only burn No. 6 fuel oil during periods of gas curtailment or gas supply interruption.

Testing requirement

1. Temple University – Health Sciences Campus shall conduct a NOx performance test on one of the three boilers every five years and whenever requested by AMS.

Monitoring and record keeping requirement

1. Temple shall monitor and record the monthly fuel usage for each boiler
2. The Permittee shall monitor and record verification of compliance with the NOx emission limits. Compliance with the NOx limit shall be based on AMS approved stack test data; AP-42 or other AMS-approved emission factors.
3. Temple shall keep records of the fuel manifests documenting the nitrogen content of No. 6 fuel oil.
4. Hourly records of NOx emissions from the boilers calculated on a weekly basis.
5. Records of the reasoning of burning fuel oil during the ozone season (May 1 – September 30),
6. Temple shall monitor and record the combined heat input of the boilers per rolling 12-month period.

Presumptive RACT Sources:

Small Boilers (heat input capacity <2 MMBTU/hr)

Table 1-1 lists sources that meet the presumptive RACT requirements specified in 25 Pa Code 129.93(c)(1) [operation and maintenance of boilers per manufacturer specifications and maximum heat input ratings <20 MMBTU/Hr;

Table 1-1 *Small Boilers*

Source Description	Capacity	Fuel/Material	Construction Date
3525 Germantown Boiler #1	1.01 MMBTU/hr	No.2 Oil	After 1970
3511 N. 13th Street Boiler	0.947 MMBTU/hr	Natural Gas	After 1970

Emergency Generators and Fire Pumps

Table 1-2 lists sources that meet the presumptive RACT requirements specified in 25 Pa Code 129.93(c)(5) [operation and maintenance of engines per manufacturer specifications and use limited to 500 hours per year or less].

Table 1-*2 Emergency generators and Fire pumps*

Source Description	Capacity	Fuel/Material	Construction Date
Pharmacy Allied Health Emergency Generator	340 kW	Natural Gas	1974
Pharmacy School Emergency Generator Fire Pump	100 kw	No. 2 Oil	1997
Dental School Emergency Generator	155 kW	No. 2 Oil	1990
GSB Emergency Generator	5 kW	Natural Gas	1978
Jones Hall Generator Fire Pump	250 kW	No. 2 Oil	1995
Old Medical School Emergency Generator	28 kW	No. 2 Oil	1950
Old Medical School Emergency Generator	300 kW	No. 2 Oil	1999
Faculty Student Union Emergency Generator	150 kW	Natural Gas	1975
Medical Office Building Emergency Generator (Outside)	125 kW	No. 2 Oil	2008
Hospital Emergency Generator A	1000 kW	No. 2 Oil	1997
Hospital Emergency Generator B	1000 kW	No. 2 Oil	1998
Hospital Emergency Generator C	450 kW	No. 2 Oil	1998
TUH-FP Fire Pump	187 bhp	No. 2 Oil	1984
Ambulatory Care Center Emergency Generator	1000 kW (1480 bhp)	No. 2 Oil	2005
Kresge West Emergency Generator	<400 kW	No. 2 Oil	1999
Kresge Science Hall	250 kW	No. 2 Oil	1997
Emergency Generator	(314 bhp)		
Medical Research Building Emergency Generator	350 bhp	No. 2 Oil	1999
Boyer (Formerly TUCMC) Emergency Generator	1250 kW	No. 2 Oil	1998

Boyer (Formerly TUCMC)	300 kW	No. 2 Oil	1998
New Medical School Emergency Generator	1000 kW	No. 2 fuel oil	2008
New Medical School Fire Pump (Inside, lower floor)	175 bhp	No. 2 fuel oil	2008
HSC Steam Plant Emergency Generator	350 kW	No. 2 Oil	1998

Appendix

Summary of Cost-Effectiveness Calculations

The following were calculated in order to evaluate the cost effectiveness of each emission control technology:

- Total Capital Investment (TCI) ($)
- Annualized Capital Investment or Capital Recovery ($/yr)
- Total Annual Cost (TAC) ($/yr)
- Baseline NOx Emissions (tons/yr)
- NOx Emission Reduction (tons/yr)
- Cost Effectiveness ($/ton)

Capital Recovery

To convert from P (present Value) to A(Annual amount), A=P(A/P,i%,n),

$$CRF = \frac{i(1+i)^n}{(1+i)^n - 1}$$

Where i= Annual interest Rate; n= control system life;

Annualized Capital Investment cost = TCI x CRF

i= 10% interest and n=15 yrs

CRF=0.1315

Cost of the Catalyst in SCR

The annual cost is given by the sinking fund factor, the amount of money the facility will need to set aside each year to be able to replace the catalyst at the end of its life, based on the lifespan of the catalyst and the interest rate. The catalyst life is 5 years.

Sinking Fund Factor (SFF) = Convert from F (Future) to A(Annual amount), A=F(A/F,i%,n),

$$SFF = \frac{i}{(1+i)^n - 1}$$

Where i= Annual interest Rate (10%); n= catalyst system life;
For i=10% and n=5 yrs; SFF=0.1638

Catalyst Annual Cost = SFF x Catalyst Cost

<u>Cost of the Ammonia in SCR and SNCR (Based on EPA cost manual)</u>

$2NH_3 + 2NO + ½ O_2 \longrightarrow 2N_2 + 3H_2O$

Ammonia cost =(17/30 * 1.05 *2 mole of Ammonia/2 mole of NO2 *NOx emission (tpy) *$410/ton

NH_3 = Ammonia (1.05 is assuming 5% ammonia slip)
NO_2 = Nitrogen dioxide
O_2 = Oxygen
H_2O = Water

Appendix
Boilers #1, #2, & #3

SCR Cost Analysis

76.4 MMBTU/hr each			
Total capital Cost per boiler			
Total Capital Investment Cost (TCI)	$679,786		Based on EPA Cost Control Manual of $6000/MMBTU/Hr. Escalated using the Marshall and Swift Index 1997 to 2014
Capital Recovery[1]	**$89,392**	**0.1315**	**CFR*TCI; 15 yrs @10% CFR=0.1315**
Annual Operating Costs			
Direct Annual Cost			Based on EPA Cost Manual
Electricity Cost[1]	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr
Ammonia[1]	$32,689	0.1638	Ammonia cost =(17/30 * 1.05 *2 mole of Ammonia/2 mole of NO2 *NOx emission (tpy)(134.77 tons) *$410/ton
Catalyst Replacement Cost[1]	$84,848	0.1638	SFF*Catalyst cost SFF=0.1638 n=5 years and i=10% Catalyst const=$518,000
Total Direct Annual Cost	**$197,990**		
Indirect Annual Cost			
Overhead[1]	$11,498		60% of maintenance-
Administrative Charge[1]	$13,596		2% of TCI-[1]
Property Taxes	$6,798		1% of TCI-[1]
Insurance	$6,798		1% of TCI-[1]
Total Indirect Annual Cost	**$128,081**		
Total Annual Operating Costs	**$326,072**		
NOx Baseline Emissions (TPY)	134.77		Based on proposed maximum emission limit
NOx Emission Reduction (TPY)	107.8		Based on 80 % NOx removal.
Cost Effectiveness ($/ton NOx removed)	**3,024**		

Fuel Switching Cost Analysis

	#6 fuel oil	#2 fuel oil	
MMBtu/year	673894	673894	
Heat Value, MMBtu/gal	0.15	0.14	
Gallons/yr	4492626.667	4813528.571	
$/Gal	$2.60	$3.06	
$/yr	$ 11,680,829.33	$14,729,397.43	
	Increased Cost	$ 3,048,568.10	
	Baseline Emissions	134.77 tons per rolling twelve month period	Based on proposed emission limit
	Emission Reduction	87.6	65% reduction
	Cost Effectiveness	$ 34,801/ton	

References:

[1]EPA Cost Manual, 6th Edition , Jan 2002, Appendix A.2.3

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Biji Pandisseril

Date: May 2, 2014

Subject: RACT Analysis for Sunoco Partners Marketing & Terminals L.P - Belmont Terminal (PLID # 01507)

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of VOC and NOx. Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

The Sunoco Partners Marketing & Terminals L.P - Belmont Terminal (Sunoco - Belmont Terminal) is located at 2700 Passyunk Avenue, Philadelphia, PA 19154. The facility's air emission sources include a Gasoline Truck Loading with Vapor Control Units products loading racks, Distillate Truck Loading, a Emergency Generator, and nine (9) Storage Tanks (with vapor pressure > 1.5 psia).

Applicability for NOx and VOC RACT:

Sunoco - Belmont Terminal is not a major source of Nitrogen Oxides (NOx). The potential NOx emission as limited by the issued AMS permits is less than 100 tons per year, the major source threshold in Philadelphia County that is not applicable to NOx RACT.
Sunoco - Belmont Terminal is a major source of Volatile Organic Compound (VOC) emissions having potential VOC emissions of greater than 50 tons per year , the major source threshold in Philadelphia County that is applicable to VOC RACT 1997 8-hour ozone NAAQS.

Process Descriptions:

The emissions units at MIPC.LLC include the following:

Gasoline Truck Loading with Vapor Control Units products loading racks,
Distillate Truck Loading,
a Emergency Generator, and
nine (9) Storage Tanks (with vapor pressure > 1.5 psia.

RACT Analysis:
In accordance, with 25 PA Code 129.91 (a) the all the source at the facility will comply with RACT requirements as follows:

The Gasoline Truck Loading Rack with Vapor Recovery Unit and Distillate Truck Loading will comply with the requirements of 25 PA Code 129.59, 129.62 and AMR V Section V (CTG: Control of Hydrocarbons form Tank Trucks Gasoline Loading Terminals) EPA 450/2-77-026)
The Storage Tanks will comply with the presumptive RACT requirement of 25 PA Code 129.57 (CTG: Control of VOCs form Storage of Petroleum Liquids in fixed roof tanks EPA 450/2-77-036 and Control of VOCs form Storage of Petroleum Liquids in external flooting tanks EPA 450/2-78-047)
For Light Liquid/Vapor Components Fugitives the facility has implemented a visual inspection (quarterly) and repair program for all pumps, valves, and flanges in VOC service.

Presumptive RACT:

The emergency generator will comply with the presumptive RACT 25 PA Code 129.93(c)(5) by operating less than 500 hours in consecutive 12-month period and will maintain & operate in accordance with manufacturer's specifications.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Noelle Helmstetter

Date: April 17, 2014

Subject: 8-Hour RACT Analysis for Aker Philadelphia Shipyard, Inc. – Phila. Naval Business Center

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Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of VOC and NOx. Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Aker Philadelphia Shipyard, Inc. – Philadelphia Naval Business Center is located at 2100 Kitty Hawk Avenue, Philadelphia, PA 19112. The facility performs the construction of standard and specialized ships.

Applicability for NOx and VOC RACT:

Aker Philadelphia Shipyard, Inc. is not a major source of Nitrogen Oxides (NOx) having potential NOx emissions less than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone NAAQS.

Aker Philadelphia Shipyard, Inc. is a major source of Volatile Organic Compounds (VOC) having potential VOC emissions greater than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

Process Descriptions:

The painting operations, including painting at the paint shop, painting at the dry dock, paint shop filters, a paint booth, and a catalytic oxidizer contribute significant levels of VOC emissions at the facility.

The facility's air emission sources contributing to VOC emissions include:

- Two (2) 12.6 MMBtu/Hr boilers burning natural gas;
- Five (5) boilers each rated less than 2 MMBtu/Hr burning natural gas;
- Two (2) 4 MMBtu/Hr boilers burning natural gas;
- Painting operations;

The facility's control devices related to VOC emissions include the following:

- 22 baghouses at the welding operations;
- Ten (10) dust collectors at the painting operations.

Presumptive RACT:

The following sources are covered by Presumptive RACT regulations, as is specified in the "Presumptive RACT Regulation" column of the table below:

External Combustion Units

Unit	Description	Heat Input (BTU/hr)	Fuel Burned	Presumptive RACT Regulation
CU-38	Paint Shop – Boiler #1	12,600,000	Natural Gas	25 PA Code 129.93(c)(1)
CU-39	Paint Shop – Boiler #2	12,600,000	Natural Gas	25 PA Code 129.93(c)(1)
CU-40	Building 620 Heater #1 (HV 620-1)	400,000	Natural Gas	25 PA Code 129.93(c)(1)
CU-41	Building 620 Heater #2 (HV 620-5)	300,000	Natural Gas	25 PA Code 129.93(c)(1)
CU-42	Building 620 Heater #3 (Compressor Room)	1,814,000	Natural Gas	25 PA Code 129.93(c)(1)
CU-43	Building 620 Heater #4 (HV 620-3)	400,000	Natural Gas	25 PA Code 129.93(c)(1)
CU-44	Building 620 Heater #5 (HV 620-4)	400,000	Natural Gas	25 PA Code 129.93(c)(1)
CU-45	Building 763 Pre-Heater	4,000,000	Natural Gas	25 PA Code 129.93(c)(1)
CU-46	Building 763 Cure Oven	4,000,000	Natural Gas	25 PA Code 129.93(c)(1)

For each boiler, the presumptive RACT requirements are the installation, operation, and maintenance of the boiler as per the manufacturer's specifications.

CTG RACT:

The following sources are covered by CTG RACT regulations, as is specified in the "CTG RACT regulation" column of the spreadsheet below.

Painting Operations

Unit	Description	CTG RACT Regulation
P-29	Paint Shop – Painting Operations	25 PA Code 129.52 & AMR V, Section XV
CD-PS-9	Paint Shop "Paint Stop Filters"	25 PA Code 129.52 & AMR V, Section XV
P-31	Dry Dock – Painting Operations	25 PA Code 129.52 & AMR V, Section XV
P-47	Building 763 Paint Booth	25 PA Code 129.52 & AMR V, Section XV
CD-PB-12	Building 763 Catalytic Oxidizer	25 PA Code 129.52 & AMR V, Section XV

For each of the painting operation sources in the table above, the CTG RACT limitation is the VOC content limit in units of pound per gallon (or grams/liter) of coating solids, cleanup requirements, and the maintenance of records kept on a daily basis in order to demonstrate compliance with the VOC limitations.

Case-by-Case RACT:

None.

Conclusions and Recommendations:

All VOC emitting sources are covered by presumptive and CTG RACT.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Noelle Helmstetter

Date: April 30, 2014

Subject: 8-Hour RACT Analysis for Inolex Chemical Company

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Inolex Chemical Company is located at Jackson and Swanson St., Philadelphia, PA 19148. The facility is a chemical manufacturing facility.

Applicability for NOx and VOC RACT:

Inolex Chemical Company is a major source of NOx having potential emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone NAAQS.

Inolex Chemical Company is not a major source of VOC having potential emissions less than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

Process Descriptions:

The facility's air emissions sources contributing to NOx emissions include the following:

- One (1) 49 MMBtu/Hr. boiler burning No. 6 oil/waste oil/natural gas and is equipped with low NOx burners
  - Unit ID: "Boiler #2";
- One (1) 20 MMBtu/hr. boiler burning No. 6 oil/No.5 oil/natural gas
  - Unit ID: "Boiler #3";
- One (1) 6.5 MMBtu/Hr. boiler burning No. 2 oil/natural gas
  - Unit ID: "Hot Oil Boiler";

Presumptive RACT:

The three boilers are covered by presumptive RACT regulations (25 PA Code 129.93), as specified in the "Presumptive RACT regulation" column of the table below.

Boilers

Unit	Heat Input (BTU/Hr)	Fuel Burned	Presumptive RACT Regulation
Boiler #3	20,000,000	No. 6 oil, No. 5 oil & Natural Gas	25 PA Code 129.93(b)(2)
Boiler #2	49,000,000	No. 6 oil, Waste oil & Natural Gas	25 PA Code 129.93(b)(2)
Hot Oil Boiler	6,500,000	No. 2 oil & Natural Gas	25 PA Code 129.93(c)(1)

For Boiler #2 and Boiler #3, the presumptive RACT requirements are the performance of annual adjustments or tune-ups of the boilers, and keeping corresponding records.

For Hot Oil Boiler, the presumptive RACT requirements are the installation, operation, and maintenance of the boiler as per the manufacturer's specifications.

Case-by-Case RACT:

None.

Conclusions and Recommendations:

All NOx emitting sources are covered by presumptive RACT.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Noelle Helmstetter

Date: April 14, 2014

Subject: 8-Hour RACT Analysis for Allied Tube & Conduit

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of VOC and NOx. Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Allied Tube & Conduit Corporation operates a tube and conduit manufacturing facility located at 11350 Norcom Road, Philadelphia, PA 19154. The facility's air emission sources include three (3) mills, one (1) tube mill acid cleaning process equipped with one (1) acid fume scrubber, one (1) Mill 1 area space heater rated 3.76 MMBtu/Hr., and four (4) warehouse space heaters each rated 801,000 Btu/Hr.

Applicability for NOx and VOC RACT:

Allied Tube & Conduit is not a major source of Nitrogen Oxides (NOx) having potential NOx emissions less than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone NAAQS.

Allied Tube & Conduit is a major source of Volatile Organic Compounds (VOC) having potential VOC emissions greater than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

Process Descriptions:

The three (3) mills route steel through a tube roll former. The mills emit VOCs during the inner-diameter (ID) coating part of the process which paints the inner-diameter of the conduit. Mill 1P has a capacity of 61,000 tons of product, Mill 2P has a capacity of 53,000 tons of product, and Mill 3P has a capacity of 50,000 tons of product.

The facility's air emission sources contributing to VOC emissions include:

- One (1) tube mill acid cleaning process;
- One (1) Mill 1 Area Space Heater with a capacity of 3.76 MMBtu/Hr. that burns natural gas;
- Four (4) Warehouse Space Heaters each with a capacity of 801,000 Btr/Hr. and burning natural gas;

The facility's control devices related to VOC emissions include the following:

- One (1) acid fume scrubber at the tube mill cleaning process;
- One (1) drop-out box in place in order to capture mist and therefore prevent aerosols from contributing to smoke and odor exhausted from the stack.

Presumptive RACT:

The following sources are covered by Presumptive RACT regulations, as is specified in the "Presumptive RACT Regulation" column of the table below:

Space Heaters

Unit	Heat Input (BTU/hr)	Fuel Burned	Presumptive RACT Regulation
MIL 1 Area Space Heater #1 (CU02)	3,760,000	Natural Gas	25 PA Code 129.93(c)
Warehouse Space Heater #1 (CU04)	801,000	Natural Gas	25 PA Code 129.93(c)
Warehouse Space Heater #2 (CU04)	801,000	Natural Gas	25 PA Code 129.93(c)
Warehouse Space Heater #3 (CU04)	801,000	Natural Gas	25 PA Code 129.93(c)
Warehouse Space Heater #4 (CU04)	801,000	Natural Gas	25 PA Code 129.93(c)

For each space heater, the presumptive RACT requirements are the installation, operation, and maintenance of the boiler as per the manufacturer's specifications.

CTG RACT:

The following sources are covered by CTG RACT regulations, as is specified in the "CTG RACT regulation" column of the spreadsheet below.

Mills

Unit	Capacity (tons of product)	CTG RACT Regulation
Mil 1P	61,000	25 PA Code 129.52(a)-(c)
Mil 2P	53,000	25 PA Code 129.52(a)-(c)
Mil 3P	50,000	25 PA Code 129.52(a)-(c)

For each of the above sources, the CTG RACT limitation is the VOC content limit in units of pound per gallon of coating solids, and the maintenance of records kept on a daily basis in order to demonstrate compliance with the VOC limitations.

Case-by-Case RACT:

None.

Conclusions and Recommendations:

All VOC emitting sources are covered by presumptive and CTG RACT.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Biji Pandisseril

Date: April 24, 2014

Subject: 1997 8-Hour RACT Analysis for Cardone Industries - (PLID # 03887-3888-2287-T0156)

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of volatile organic compounds (VOC) and nitrogen oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Cardone Industries owns and operates an automobile part remanufacturing facility in Philadelphia, Pennsylvania. Equipment used at the facility include degreasing operations and combustion sources.

Applicability for NOx and VOC RACT:

Cardone Industries is not a major source for NOx since the potential NOx emissions are less than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone NAAQS. The facility is a major source of VOC having potential emissions greater than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

The 1-hour RACT determination (PA Permit Number 51-3887 & 51-2237) dated May 29, 1995 was approved into the SIP by EPA on 10/30/01 (66 FR 54710).

Process Descriptions:

Cardone Industries VOC emission sources are as follows:

Source ID	***Source Description***
Surface Coating	
SB01	Electrostatic Disk Spray Booth
SB02	Manual Spray Booth Post Spray
SB03	Floor Type Spray Booth Pre-Spray
SB05	Touch-up Spray Booth
SB07	Touch-up Spray Booth
SB08	Manual Spray Booth
SB10	Manual Spray Booth
SB11	Manual Spray Booth
Cold-Cleaning Degreasers	
V01	Vibrator Flowthru 55ft
V08	Vibrator 6ft
V15	Ultra Tub Vibrator 17 (5 ft)
V18	Ultra Tub Vibrator 3 (5ft)
V19	Ultra Tub Vibrator (3ft)
T05	Small Parts Tank (4sq ft)
T07	Small Parts Tank (4sq ft)

T08	Small Parts Tank (4sq ft)			
TM02	Auger Tumbler Hurricane			

Combustion Units

CU-SB04	Conveyorized Forced Air Drying Oven			1.5 MMBTU/hr
CU-W12	Goff Hydropulse Washer	0.		5 MMBTU/hr
CU-W13	Goff Hydropulse Washer	0.		5 MMBTU/hr
CU-W14	Tally Washer			0.3 MMBTU/hr
CU-W15	Washer, American Metal Wash			0.3 MMBTU/hr
CU-W16	Parts Washer Beltwasher 2310			0.8 MMBTU/hr
CU-W17	Water Heaters (2) Instant			0.94 MMBTU/hr
CU-W18	Parts Washing Machine	0.		4 MMBTU/hr
CU-W19	Ransohoff tunnel washer	1		.9 MMBTU/hr
CU-W20	Goff Hydropulse HP-6 Washer			0.3 MMBTU/hr
CU-W21	Goff Hydropulse HP-3SC (Autoline)			0.3 MMBTU/hr
CU-W44	Goff Hydropulse HP-63 Washer			0.3 MMBTU/hr
CU-B02	Fulton Thermal Liquid Heater		2.	4 MMBTU/hr
CU-B03	Fulton Thermal Liquid Heater		2.	4 MMBTU/hr
CU-B04	Propane Backup System Vaporizer		0	.84 MMBTU/hr
CU-W22	Hot Water Washing Machine (Kuhl)			4.65 MMBTU/hr
CU-W24	Hot Water Washing Machine (Ransohoff)			5.3 MMBTU/hr
CU-W29	HPI Belt Washer System #3			0.44 MMBTU/hr
CU-W31	HPI Belt Washer 1610WR-SO		0	.44 MMBTU/hr
CU-W33	Detergent Belt Washer	0		.8 MMBTU/hr
CU-W35	Steam Cleaner	257,600		BTU/hr
CU-W36	Steam Cleaner	257,600		BTU/hr
CU-W43	Lakeview water evaporator		0.	9 MMBTU/hr
CU-T13	Acid Dip tank with tumbler			0.4 MMBTU/hr
CU-B05	Backup Propane System Burner		0	.84 MMBTU/hr
CU-B09	Boiler Hot Water	2.		2 MMBTU/hr
CU-B16	Hot Air Unit			0.4 MMBTU/hr
CU-B17	Hot Air Unit	0		.4 MMBTU/hr
CU-B18	Hot Air Unit	0		.8 MMBTU/hr
CU-B19	Hot Air Unit	2		.2 MMBTU/hr
CU-B20	Hot Air Unit	2		.2 MMBTU/hr
CU-B21	Carrier HVAC 48TJD020 Roof unit			0.270 MMBTU/hr
CU-B22	Carrier HVAC 48TJD020 Roof unit			0.270 MMBTU/hr
CU-B23	Carrier HVAC 48TJD020 Roof unit			0.270 MMBTU/hr
CU-B24	Carrier HVAC 48TJD020 Roof unit			0.270 MMBTU/hr
CU-B25	Carrier HVAC 48TJD020 Roof unit			0.270 MMBTU/hr
CU-B26	Carrier HVAC 48TJD020 Roof unit			0.270 MMBTU/hr
CU-B27	Carrier HVAC 48TJD020 Roof unit			0.270 MMBTU/hr
CU-B28	Carrier HVAC 48TJD020 Roof unit			0.270 MMBTU/hr
CU-B29	Carrier HVAC 48DKD028 Roof unit			0.255 MMBTU/hr
CU-B30	Carrier HVAC 48DKD028 Roof unit			0.255 MMBTU/hr
CU-B31	Carrier HVAC 48DKD028 Roof unit			0.255 MMBTU/hr
CU-B32	Cambridge HVAC C390 Roof unit			0.4 MMBTU/hr
CU-B33	Cambridge HVAC C390 Roof unit			0.4 MMBTU/hr
CU-B34	Cambridge HVAC C600 Roof unit			0.582 MMBTU/hr
CU-B35	Cambridge HVAC C600 Roof unit			0.582 MMBTU/hr
CU-B36	Cambridge HVAC C600 Roof unit			0.582 MMBTU/hr
CU-B37	Cambridge HVAC C600 Roof unit			0.582 MMBTU/hr
CU-B38	Cambridge HVAC C600 Roof unit			0.582 MMBTU/hr
CU-B39	Cambridge HVAC C600 Roof unit			0.582 MMBTU/hr
CU-B40	Cambridge HVAC C600 Roof unit			0.582 MMBTU/hr
CU-B41	Cambridge HVAC C900 Roof unit			0.9 MMBTU/hr
CU-B42	Cambridge HVAC C900 Roof unit			0.9 MMBTU/hr
CU-B43	Cambridge HVAC C900 Roof unit			0.9 MMBTU/hr
CU-B44	Cambridge HVAC C900 Roof unit			0.9 MMBTU/hr
CU-B45	Cambridge HVAC C900 Roof unit			0.9 MMBTU/hr

CU-B46	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B47	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B48	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B49	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B50	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B51	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B52	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B53	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B54	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B55	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B56	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B57	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B58	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B59	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B60	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B61	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B62	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B63	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B64	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B65	Cambridge HVAC C900 Roof unit	0.9 MMBTU/hr
CU-B66	Cambridge HVAC C1200 Roof unit	1.2 MMBTU/hr
CU-B67	Cambridge HVAC C1200 Roof unit	1.2 MMBTU/hr
CU-B68	Cambridge HVAC C1200 Roof unit	1.2 MMBTU/hr
CU-B70	Cambridge HVAC M-136	4.8 MMBTU/hr

Burnout Ovens

CD-O01	Burnout Oven (8 bskt) w/ Integral Afterburner	2 MMBTU/hr
CD-O04	Burnout Oven (8 bskt) w/ Integral Afterburner	3 MMBTU/hr
CD-O05	Burnout Oven (12 bskt) w/ Integral Afterburner	3 MMBTU/hr
CD-O06	Burnout Oven (12 bskt) w/ Integral Afterburner	3 MMBTU/hr
CD-O07	Burnout Oven (12 bskt) w/ Integral Afterburner	3 MMBTU/hr
CD-O09	Burnout Oven (12 bskt) w/ Integral Afterburner	3 MMBTU/hr
CD-O11	Burnout Oven (12 bskt) w/ Integral Afterburner	3 MMBTU/hr
CD-O12	Burnout Oven (8 bskt) w/ Integral Afterburner	3 MMBTU/hr
CD-O14	Burnout Oven (12 bskt) w/ Integral Afterburner	3 MMBTU/hr
CD-O15	Seghers Fluid Bed Oven B-3111/RAN	0.93 MMBTU/hr
CD-O16	Burnout Oven w/ Integral Afterburner (Guspro 12 basket)	3 MMBTU/hr
CD-018	Burnout Oven w/ Integral Afterburner (1 basket)	0.70 MMBTU/hr

Emergency Generator

CU-B06	Onan Backup Generator System - Diesel	1.9 MMBTU/hr

Chew Street - Solvent Recovery / Vapor Condenser

The Solvent Recovery process with a vapor condenser was part of original 1-hour RACT analysis for the facility has been out of operation at the facility. The entire facility has stopped used to Stoddard Solvent and does not recover the solvent. The facility has since not operated the solvent recovery system. If the recovery system is re-activated, the facility will submit a Request for Determination (RFD) or permit application to bring back the unit to operation.

RACT Analysis:

Surface Coating

Each spraybooth at the facility is complying with the RACT requirements of 25 Pa Code §129.52 - Miscellaneous metal parts & products, air-dried coatings.

Cold Cleaning Degreasers

The miscellaneous cold degreasing operations include dipping, soaking, and agitating tank operations as well as numerous workstation wiping operations throughout the facility. Potential emissions for the facility degreasing operations is linked to total production capacity for the facility. Each

cold-cleaning degreasing operation at the facility is complying with the RACT requirements of 25 PA Code 129.63

Combustion Units and Burnoff Ovens.

Each Combustion Unit and Burnoff Oven is less than 20 million BTU and burns natural gas or propane. Thus, all combustion units are complying with 25 PA Code 129.93(c)(1) presumptive RACT requirements for installation, maintenance, and operation in accordance with manufacturers specification.

Emergency Generator

The emergency generator is complying with 25 PA Code 129.93(c)(5) presumptive RACT requirements to operate less than 500 hours in a consecutive 12-month period

Solvent Recovery:

The Solvent Recovery process was part of original 1-hour RACT analysis and was required to install a vapor condenser. The solvent recovery process has been out of operation at the facility and the entire facility has stopped used to Stoddard Solvent, therefore does not recover the solvent. The facility has since not operated the solvent recovery system. If the recovery system is re-activated, the facility will submit a Request for Determination (RFD) or permit application to bring back the unit to operation.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Biji Pandisseril

Date: April 24, 2014

Subject: RACT Analysis for MIPC.LLC - Philadelphia Terminal (PLID # 05004)

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of VOC and NOx. Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

The MIPC LLC - Philadelphia Terminal (formerly ConocoPhillips) is located at G Street and Hunting Park Avenue, Philadelphia, PA 19124. The facility's air emission sources include two petroleum products loading racks, nine petroleum products storage tanks (five with vapor pressure > 1.5 psia), and two oil-water separators. Gasoline loading is controlled by a vapor recovery unit.

Applicability for NOx and VOC RACT:

MIPC, LLC is not a major source of Nitrogen Oxides (NOx). The potential NOx emission as limited by the issued AMS permits is less than 100 tons per year, the major source threshold in Philadelphia County that is not applicable to NOx RACT.
MIPC,LLC is a major source of Volatile Organic Compound (VOC) emissions having potential VOC emissions of greater than 50 tons per year , the major source threshold in Philadelphia County that is applicable to VOC RACT 1997 8-hour ozone NAAQS.

Process Descriptions:

The emissions units at MIPC.LLC include the following:

One Truck Loading Rack with Vapor Recovery Unit and Transmix Loading Spot,
Five Light Petroleum Storage Tanks (#1303, #1322, #1311, #1312, & #1314),
Three Additive Storage Tanks (#1300, #1350, & #1351),
One Transmix Storage Tank (#1330),
Two Oil/Water Separators, and
Light Liquid/Vapor Components Fugitives.

RACT Analysis:
In accordance, with 25 PA Code 129.91 (a) the all the source at the facility will comply with RACT requirements as follows:

The Truck Loading Rack with Vapor Recovery Unit will comply with the requirements of 25 PA Code 129.59 and 129.62.
The Light Petroleum Storage Tanks will comply with the presumptive RACT requirement of 25 PA Code 129.56.
Transmix Storage Tank (#1330) will comply with the presumptive RACT requirement of 25 PA Code 129.57.
Two Oil/Water Separators complies with CTG (EPA-450/2-77-025) by complying with AMR V Sec III

For Light Liquid/Vapor Components Fugitives the facility has implemented a visual inspection (quarterly) and repair program for all pumps, valves, and flanges in VOC service.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Noelle Helmstetter

Date: February 24, 2014

Subject: 8-Hour RACT Analysis for University of Pennsylvania

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of VOC and NOx. Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

The University of Pennsylvania is located at 3451 Walnut Street, Philadelphia, PA 19104. The facility's air emission sources include nine (9) heaters and furnaces rated less than 10 MMBTU/hr, 56 emergency generators, one peak shaving generator, and two fire pumps.

Applicability for NOx and VOC RACT:

The University of Pennsylvania is a major source of Nitrogen Oxides (NOx) having potential NOx emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone NAAQS.

The University of Pennsylvania is not a major source of Volatile Organic Compounds (VOC) having potential VOC emissions less than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

Process Descriptions:

The facility's air emission sources contributing to NOx emissions include the following:

- Nine (9) heaters and furnaces rated less than 10 MMBTU/hr each burn natural gas;
- 15 emergency generators with capacities ranging between 75 kW - 750 kW that each burn natural gas;
- 41 emergency generators with capacities ranging between 150 kW – 1,750 kW that each burn diesel;
- Two (2) fire pumps with capacities ranging between 150 hp – 187 hp each burn diesel;
- One (1) peak-shaving generator with a capacity of 2,000 kW and has Selective Catalytic Reduction (SCR) that burns diesel.

Presumptive RACT:

The following sources are covered by presumptive RACT 25 Pa Code 129.93 (c). For each of the following sources, the presumptive RACT emission limitation is the installation, maintenance, and operation of each source in accordance with manufacturers' specifications.

Heaters & Furnaces

Unit	Heat Input (BTU/hr)	Fuel Burned	Presumptive RACT Regulation
Greenfield Center	686,000	Natural Gas	25 Pa Code 129.93(C)
Munger 1 Heater	750,000	Natural Gas	25 Pa Code 129.93(C)
Heater, Psychology Office	780,000	Natural Gas	25 Pa Code 129.93(C)
Penn Safety Building Heater	1,500,000	Natural Gas	25 Pa Code 129.93(C)
Heater, WXPN	623,000	Natural Gas	25 Pa Code 129.93(C)
Heater, 3401 Walnut St.	2,049,000	Natural Gas	25 Pa Code 129.93(C)
Munger 2 Heater	750,000	Natural Gas	25 Pa Code 129.93(C)
4015 Walnut Heater	1,500,000	Natural Gas	25 Pa Code 129.93(C)
133 S. 36th St.	4,704,000	Natural Gas	25 Pa Code 129.93(C)

Fire Pumps

Unit	Capacity (HP)	Fuel Burned	Presumptive RACT Regulation
Steinberg Conference Center Fire Pump	187	Diesel	25 Pa Code 129.93(C)
Fagin Hall Fire Pump	150	Diesel	25 Pa Code 129.93(C)

Emergency Generators (Natural Gas)

Unit	KW Rate Capacity (KW)	Fuel Burned	Presumptive RACT Regulation
Emergency Generator, 1920 Commons	75	Natural Gas	25 Pa Code 129.93(C)
Emergency Generator, Nursing Education (Fagin Hall)	100	Natural Gas	25 Pa Code 129.93(C)
Emergency Generator, 3401 Walnut St.	115	Natural Gas	25 Pa Code 129.93(C)
Emergency Generator, Blockley Hall	120	Natural Gas	25 Pa Code 129.93(C)
Emergency Generator, Williams Hall	120	Natural Gas	25 Pa Code 129.93(C)
Emergency Generator, Nichols House (Sansom Place E)	140	Natural Gas	25 Pa Code 129.93(C)
Emergency Generator, Vance Hall	750	Natural Gas	25 Pa Code 129.93(C)
Emergency Generator, Hi Rise South (Harrison House)	225	Natural Gas	25 Pa Code 129.93(C)
Emergency Generator, Annenberg #2	150	Natural Gas	25 Pa Code 129.93(C)
Emergency Generator, High Rise East (Harnell)	150	Natural Gas	25 Pa Code 129.93(C)
Emergency Generator, Mudule VI#1	120	Natural Gas	25 Pa Code 129.93(C)
Emergency Generator, Module VI#2	120	Natural Gas	25 Pa Code 129.93(C)
Emergency Generator, Sansom Commons West	100	Natural Gas	25 Pa Code 129.93(C)
Emergency Generator, Maloney (HUP)	215	Natural Gas	25 Pa Code 129.93(C)
Emergency Generator, Alumni Hall (HUP)	150	Natural Gas	25 Pa Code 129.93(C)

Emergency Generators (Diesel)

Unit	KW Rate Capacity (KW)	Fuel Burned	Presumptive RACT Regulation
Emergency Generator, Johnson Pavilion	500	Diesel	25 Pa Code 129.93(C)
Emergency Generator, CRB #2	100	Diesel	25 Pa Code 129.93(C)
Emergency Generator, CRB #1	1000	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Richards	500	Diesel	25 Pa Code 129.93(C)
Emergency Generator, John Morgan	350	Diesel	25 Pa Code 129.93(C)
Emergency Generator, High Rise North (Rodin House)	235	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Steinberg Conf. Ctr.	350	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Stemmler Hall	565	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Law Library (Tanenabaum)	600	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Stellar Chance	1000	Diesel	25 Pa Code 129.93(C)
Emergency Generator, VHUP (ryan)	1025	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Silverstein #1	565	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Founders #1	650	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Founders #9	650	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Founders #10	1000	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Rhoads	800	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Penn Safety Building	150	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Tandem Building	150	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Huntsman Hall	600	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Levine Hall	120	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Vagelos	800	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Module VII	250	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Pottruck	250	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Schattner	600	Diesel	25 Pa Code 129.93(C)
Emergency Generator, 40th Street Garage	200	Diesel	25 Pa Code 129.93(C)
Emergency Generator, BRBII/III #1	1275	Diesel	25 Pa Code 129.93(C)
Emergency Generator, BRBII/III #2	1275	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Dulles (HUP)	1000	Diesel	25 Pa Code 129.93(C)
Emergency Generator, ISC Nap (Sansom East)	150	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Skirkanich	750	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Life Science Building (Lynch)	750	Diesel	25 Pa Code 129.93(C)
Emergency Generator, New Vet Building (Hill)	1250	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Ravdin White	800	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Silverstein #2	600	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Fisher-Bennett Hall	150	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Annenberg Public Policy (APPC) and Steinburg Conference Center	250	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Translation Research Center (TRC) and Fagin Hall	1500	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Translation Research Center (TRC)	1500	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Stemmler Hall	900	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Perelman Center for Adv. Med.	1750	Diesel	25 Pa Code 129.93(C)
Emergency Generator, Penn Tower	500	Diesel	25 Pa Code 129.93(C)

Other:

The following sources are not applicable to Presumptive RACT, CTG RACT, or Case-by-Case RACT regulations, as is specified in the "Comment" column of the table below:

Peak-Shaving Generator w/ SCR

Unit	KW Rate Capacity (KW)	Fuel Burned	Comment
Peak Shaving Generator with SCR	2000	Diesel	N/A - De Minimis (<2 tons/year)

No RACT requirement is necessary as the VOC PTE for this source is less than 2 tons per year and is therefore considered de minimis. Additionally, this unit is equipped with a non-selective catalytic reduction device.

Conclusions and Recommendations:

All sources are covered by presumptive RACT or are considered de minimis.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Noelle Helmstetter

Date: April 30, 2014

Subject: 8-Hour RACT Analysis for Philadelphia Prison System

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of VOC and NOx. Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Philadelphia Prison System is a correctional institution which houses inmates. The facility is located at 8001 State Road, Philadelphia, PA 19136.

Applicability for NOx and VOC RACT:

The Philadelphia Prison System is a major source of Nitrogen Oxides (NOx) having potential NOx emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone NAAQS.

The Philadelphia Prison System is not a major source of Volatile Organic Compounds (VOC) having potential VOC emissions less than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

Process Descriptions:

The facility's air emission sources contributing to NOx emissions include the following:

- 57 boilers rated less than 15 MMBtu/Hr burning No. 2 oil/ natural gas;
- 10 emergency generators less than or equal to 2,200 hp burning diesel;
- One (1) 365 hp chiller burning natural gas
    - Unit ID: CURCF6.

Presumptive RACT:

The following sources are covered by presumptive RACT regulations, as is specified in the "Presumptive RACT regulation" column of the table on the next page.

Unit	Heat Input (MMBTU/hr)	Fuel Burned	Presumptive RACT Regulation
CUMAINT1	2.00	No. 2 fuel oil	25 PA Code 129.93 (c)
CUMAINT2	2.00	No. 2 fuel oil	25 PA Code 129.93 (c)
CUMAINT3	5.00	No. 2 fuel oil	25 PA Code 129.93 (c)
CUMAINT4	5.00	No. 2 fuel oil	25 PA Code 129.93 (c)
CUHOC1	8.00	No. 2 fuel oil	25 PA Code 129.93 (c)
CUHOC2	8.00	No. 2 fuel oil	25 PA Code 129.93 (c)
CUHOC3	8.00	No. 2 fuel oil	25 PA Code 129.93 (c)
CUHOC18	0.25	No. 2 fuel oil	25 PA Code 129.93 (c)
CUHOC19	0.27	No. 2 fuel oil	25 PA Code 129.93 (c)
CUHOC20	0.80	No. 2 fuel oil	25 PA Code 129.93 (c)
CUHOC21	0.80	No. 2 fuel oil	25 PA Code 129.93 (c)
CUHOC22	0.80	No. 2 fuel oil	25 PA Code 129.93 (c)
CUDC13	2.80	No. 2 fuel oil	25 PA Code 129.93 (c)
CUDC14	2.80	No. 2 fuel oil	25 PA Code 129.93 (c)
CUDC15	2.80	No. 2 fuel oil	25 PA Code 129.93 (c)
CUDC10	7.22	No. 2 fuel oil	25 PA Code 129.93 (c)
CUDC11	7.22	No. 2 fuel oil	25 PA Code 129.93 (c)
CUDC12	7.22	No. 2 fuel oil	25 PA Code 129.93 (c)
CUPICC6	8.76	No. 2 fuel oil	25 PA Code 129.93 (c)
CUPICC7	8.76	No. 2 fuel oil	25 PA Code 129.93 (c)
CUPICC8	8.76	No. 2 fuel oil	25 PA Code 129.93 (c)
CUPHSW4	1.25	No. 2 fuel oil	25 PA Code 129.93 (c)
CUPHSW5	1.25	No. 2 fuel oil	25 PA Code 129.93 (c)
CUCFCF1	2.22	No. 2 fuel oil	25 PA Code 129.93 (c)
CUCFCF2	2.22	No. 2 fuel oil	25 PA Code 129.93 (c)
CUCFCF3	2.22	No. 2 fuel oil	25 PA Code 129.93 (c)
CUCFCF4	14.70	No. 2 fuel oil	25 PA Code 129.93 (c)
CUCFCF5	14.70	No. 2 fuel oil	25 PA Code 129.93 (c)
CUCFCF6	14.70	No. 2 fuel oil	25 PA Code 129.93 (c)
CUCFCF7	14.70	No. 2 fuel oil	25 PA Code 129.93 (c)
CUCFCF8	14.70	No. 2 fuel oil	25 PA Code 129.93 (c)
CURCF1	7.00	No. 2 fuel oil	25 PA Code 129.93 (c)
CURCF2	7.00	No. 2 fuel oil	25 PA Code 129.93 (c)
CURCF8	1.04	No. 2 fuel oil	25 PA Code 129.93 (c)
CURCF9	1.04	No. 2 fuel oil	25 PA Code 129.93 (c)
CUHOC16	2.05	Natural Gas	25 PA Code 129.93 (c)
CUHOC23	2.05	Natural Gas	25 PA Code 129.93 (c)
CUHOC24	2.40	Natural Gas	25 PA Code 129.93 (c)
CUHOC25	2.40	Natural Gas	25 PA Code 129.93 (c)
CUDC16	0.52	Natural Gas	25 PA Code 129.93 (c)
CUCFCF24	1.90	Natural Gas	25 PA Code 129.93 (c)
CUCFCF25	1.90	Natural Gas	25 PA Code 129.93 (c)
CUCFCF26	1.90	Natural Gas	25 PA Code 129.93 (c)
CUCFCF27	1.90	Natural Gas	25 PA Code 129.93 (c)
CUCFCF28	1.90	Natural Gas	25 PA Code 129.93 (c)
CUCFCF29	1.90	Natural Gas	25 PA Code 129.93 (c)
CUCFCF30	1.90	Natural Gas	25 PA Code 129.93 (c)
CUCFCF31	1.90	Natural Gas	25 PA Code 129.93 (c)
CUCFCF32	1.90	Natural Gas	25 PA Code 129.93 (c)
CUCFCF18	1.90	Natural Gas	25 PA Code 129.93 (c)
CUCFCF33	1.90	Natural Gas	25 PA Code 129.93 (c)
CUCFCF34	1.90	Natural Gas	25 PA Code 129.93 (c)
CUHBF1	2.25	Natural Gas	25 PA Code 129.93 (c)
CUHBF2	1.71	Natural Gas	25 PA Code 129.93 (c)
CUHBF3	0.74	Natural Gas	25 PA Code 129.93 (c)
CUHBF4	0.91	Natural Gas	25 PA Code 129.93 (c)
CUHBF5	1.07	Natural Gas	25 PA Code 129.93 (c)

For the all 57 boilers rated less than 15 MMBtu/Hr, the presumptive RACT requirement is the installation, operation, and maintenance of the boiler as per the manufacturer's specifications.

Emergency Generators

Unit	Heat Input (MMBTU/hr)	Fuel Burned	Presumptive RACT Regulation
CUPHSW3	355	Diesel	25 PA Code 129.93 (c)
CUHOC11	550	Diesel	25 PA Code 129.93 (c)
CUHOC12	211	Diesel	25 PA Code 129.93 (c)
CUPICC4	740	Diesel	26 PA Code 129.93 (c)
CUPICC5	740	Diesel	27 PA Code 129.93 (c)
CUCFCF21	2,200	Diesel	28 PA Code 129.93 (c)
CUCFCF22	2,200	Diesel	29 PA Code 129.93 (c)
CUCFCF23	2,200	Diesel	30 PA Code 129.93 (c)
CURCF7	2,681	Diesel	31 PA Code 129.93 (c)
CUHBF6	355	Diesel	32 PA Code 129.93 (c)

For the ten (10) emergency generators running less than 500 hours per 12-month period, the presumptive RACT requirement is the installation, operation, and maintenance of the boiler as per the manufacturer's specifications.

Other:

The following sources are not applicable to Presumptive RACT, CTG RACT, or Case-by-Case RACT regulations, as is specified in the "Comment" column of the table below:

Chiller

Unit	Description	Fuel Burned	Comment
CURCF6	RCF Chiller #1 (with non-selective catalytic reduction device)	Natural Gas	N/A - De Minimis (< 7 tons/year)

No RACT requirement is necessary as the VOC PTE for this source is less than 7 tons per year and is therefore considered de minimis. Additionally, this unit is equipped with a non-selective catalytic reduction device.

Case-by-Case RACT:

None.

Conclusions and Recommendations:

All NOx emitting sources are covered by presumptive RACT or are De Minimis.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Noelle Helmstetter

Date: September 3, 2014

Subject: 1997 8-Hour RACT Analysis for Kinder Morgan Liquids Terminals, LLC

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Kinder Morgan Liquids Terminals, LLC owns and operates as a bulk liquid terminal that warehouses a variety of chemicals/materials based on customer's demand. The materials/chemicals are in-bounded via ship/barge, rail car, and tank trucks and then the materials/chemicals are stored in fixed roof and internal floating roof tanks. The material/chemicals are shipped out by ship/barge, rail car, and tank truck.

Kinder Morgan Liquids Terminals, LLC was previously named "GATX Terminals Corporation."

Applicability for NOx and VOC RACT:

Kinder Morgan Liquids Terminals, LLC is not a major source of NOx having potential NOx emissions less than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone NAAQS.

Kinder Morgan Liquids Terminals, LLC is a major source of VOC having potential VOC emissions greater than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

1-hour RACT:

Kinder Morgan Liquids Terminals, LLC is subject to the 1-hour RACT. As a result of a case-by-case RACT determination, the facility is subject to the 1-hour RACT Plan Approval listed under the facility's previous name, "GATX Terminals Corporation", effective on May 29, 1995, and approved by EPA on October 31, 2001 in 66 FR 54936.

Process Descriptions:

The facility's air emissions sources contributing to VOC emissions include the following:

- One (1) 490 hp emergency generator (Emergency Generator #1);
- Two (2) 85 hp air compressors;
- One (1) 13.4 MMBtu/Hr boiler (Boiler #2);
- One (1) 12.6 MMBtu/Hr boiler (Boiler #1);
- 108 storage tanks (81 storage tanks with capacities greater than or equal to 40,000 gallons, 27 storage tanks with capacities less than 40,000 gallons);
- Marine vessel loading
- Tank truck/tank car loading
- Fugitive emissions from process piping pumps, valves, & flanges;
- Tank cleaning and degassing operation;
- Soil vapor extraction system with CatOx;

- Sand blasting of tanks (listed as "insignificant sources" on Title V Operating Permit V95-044);
- Painting of tanks (listed as "insignificant sources" on Title V Operating Permit V95-044);
- Sump tank (listed as "insignificant sources" on Title V Operating Permit V95-044);
- Catch basins (listed as "insignificant sources" on Title V Operating Permit V95-044);
- Two oil water separator (Receives <200 gallons of organic materials per day, listed as "insignificant sources" on Title V Operating Permit V95-044);
- Drumming operations (listed as "insignificant sources" on Title V Operating Permit V95-044);
- Steam cleaning of equipment (listed as "insignificant sources" on Title V Operating Permit V95-044);
- Chemical dryers (listed as "insignificant sources" on Title V Operating Permit V95-044);
- Pipe cleaning (listed as "insignificant sources" on Title V Operating Permit V95-044);
- Flushing of tanks with incoming products (listed as "insignificant sources" on Title V Operating Permit V95-044);
- Fire equipment (listed as "insignificant sources" on Title V Operating Permit V95-044);
- Mobile tanks (500 gallons each, listed as "insignificant sources" on Title V Operating Permit V95-044);
- Tanks 1 (Emergency containment tank, listed as "insignificant sources" on Title V Operating Permit V95-044);
- Tanks 2 and 3 (Emergency containment tank, listed as "insignificant sources" on Title V Operating Permit V95-044);
- Tank no. 471 (#2 oil for the vapor incinerator, listed as "insignificant sources" on Title V Operating Permit V95-044);
- Tank no. 420 (#2 oil for the boilers, listed as "insignificant sources" on Title V Operating Permit V95-044);

The facility's control devices for these emissions units include the following:

- One (1) NAO Thermal Oxidation Unit (aka Thermal Incinerator)
  - This unit captures VOC emissions at the tank truck/tank car loading operations.
- One (1) Vapor Combustor
  - This unit was installed after the SIP-approved1-hr RACT plan approval was issued, and it is only used during marine loading cumene operations. This unit was installed when the facility began marine loading cumene to ensure they stay below the facility-wide HAP synthetic minor limits.

VOC RACT Evaluation

Presumptive RACT:

The following sources are covered by Presumptive RACT regulations, as is specified in the "Presumptive RACT Regulation" column of the table below:

Boilers

Source	Description	Capacity (hp)	Fuel Burned	Presumptive RACT Regulation
CU01	Boiler #1, Hurst Boiler	12.6	No. 2, Natural Gas	25 Pa Code 129.93(c)(1)
CU01A 01	Boiler #2, York Boiler	13.4	No. 2, Natural Gas	25 Pa Code 129.93(c)(1)

For the one (1) 13.4 MMBtu/Hr boiler and the one (1) 12.6 MMBtu/Hr, the presumptive RACT requirement is the installation, operation, and maintenance of the boiler as per the manufacturer's specifications. These RACT requirements for Boiler #2, are part of the 1-hour RACT Plan Approval for the facility (under its former name "GATX Terminals Corporation"), effective on May 29, 1995, and approved by EPA on October 31, 2001 in 66 FR 54936.

Emergency Generator

Source	Description	Capacity (hp)	Fuel Burned	Presumptive RACT Regulation
EG01	Emergency Generator 1	490	Diesel	25 PA Code 129.93(c)(5)

For the one (1) 490 hp emergency generator, the presumptive RACT requirement is the installation, operation, and maintenance of the unit as per the manufacturer's specifications.

Control Devices

Source	Presumptive RACT Regulation
NAO Thermal Oxidizer	25 PA Code 129.93(c)(4)
Vapor Combustor	25 PA Code 129.93(c)(4)

For the NAO Thermal Oxidization Unit and the Vapor Combustor, the presumptive RACT requirement is the installation, operation, and maintenance of the unit as per the manufacturer's specifications. These RACT requirements for the NAO Thermal Oxidation Unit are part of the 1-hour RACT Plan Approval for the facility (under its former name "GATX Terminals Corporation"), effective on May 29, 2995, and approved by EPA on October 31, 2001 in 66 FR 54936.

CTG RACT [i.e. Applicable Adopted Rules in accordance with EPA's Control Technique Guidelines (CTGs)]:

The storage tanks are covered by CTG RACT regulations, as specified in the "CTG RACT Regulation" column of the following table:

Storage Tanks

Source ID	Description*	Capacity (gallons)	CTG RACT Regulation
P051	VFR DSP	5,382	25 PA Code 129.57
P052	VFR DSP	5,363	25 PA Code 129.57
P053	VFR DSP	5,387	25 PA Code 129.57
P054	VFR DSP	5,375	25 PA Code 129.57
P055	VFR DSP	5,341	25 PA Code 129.57
P056	VFR DSP	5,345	25 PA Code 129.57
P057	VFR DSP	5,364	25 PA Code 129.57
P058	VFR DSP	5,367	25 PA Code 129.57
P104	VFR	419,527	25 PA Code 129.56 & AMR V, Section II
P105	VFR	417,744	25 PA Code 129.56 & AMR V, Section II
P106	VFR	556,755	25 PA Code 129.56 & AMR V, Section II
P107	DS IFR	127,039	25 PA Code 129.56 & AMR V, Section II
P108	VFR	126,882	25 PA Code 129.56 & AMR V, Section II
P121	VFR	214,548	25 PA Code 129.56 & AMR V, Section II
P122	VFR	428,569	25 PA Code 129.56 & AMR V, Section II
P123	VFR	738,192	25 PA Code 129.56 & AMR V, Section II
P124	DS IFR	1,584,987	25 PA Code 129.56 & AMR V, Section II
P125	IFR	2,124,954	25 PA Code 129.56 & AMR V, Section II
P126	VFR	214,748	25 PA Code 129.56 & AMR V, Section II
P127	VFR	422,780	25 PA Code 129.56 & AMR V, Section II
P128	VFR	425,518	25 PA Code 129.56 & AMR V, Section II
P129	VFR	739,384	25 PA Code 129.56 & AMR V, Section II
P130	VFR	126,804	25 PA Code 129.56 & AMR V, Section II
P131	VFR	126,246	25 PA Code 129.56 & AMR V, Section II
P133	VFR	843,751	25 PA Code 129.56 & AMR V, Section II
P134	VFR	427,695	25 PA Code 129.56 & AMR V, Section II
P135	VFR	636,524	25 PA Code 129.56 & AMR V, Section II
P137	VFR	224,621	25 PA Code 129.56 & AMR V, Section II
P140	VFR	126,854	25 PA Code 129.56 & AMR V, Section II
P141	VFR	425,715	25 PA Code 129.56 & AMR V, Section II
P142	VFR	210,694	25 PA Code 129.56 & AMR V, Section II
P143	IFR	406,159	25 PA Code 129.56 & AMR V, Section II
P144	VFR	428,500	25 PA Code 129.56 & AMR V, Section II
P145	VFR	424,621	25 PA Code 129.56 & AMR V, Section II
P146	VFR	423,555	25 PA Code 129.56 & AMR V, Section II
P147	VFR	424,660	25 PA Code 129.56 & AMR V, Section II
P148	IFR	795,557	25 PA Code 129.56 & AMR V, Section II
P149	IFR	401,184	25 PA Code 129.56 & AMR V, Section II
P150	IFR	403,777	25 PA Code 129.56 & AMR V, Section II
P151	IFR	799,391	25 PA Code 129.56 & AMR V, Section II
P152	IFR	806,968	25 PA Code 129.56 & AMR V, Section II
P153	IFR	424,961	25 PA Code 129.56 & AMR V, Section II
P154	VFR	447,628	25 PA Code 129.56 & AMR V, Section II
P155	VFR	844,179	25 PA Code 129.56 & AMR V, Section II
P156	VFR	857,938	25 PA Code 129.56 & AMR V, Section II
P157	VFR	424,207	25 PA Code 129.56 & AMR V, Section II
P158	VFR	424,711	25 PA Code 129.56 & AMR V, Section II
P159	IFR	813,594	25 PA Code 129.56 & AMR V, Section II
P160	IFR	808,142	25 PA Code 129.56 & AMR V, Section II
P161	IFR	819,026	25 PA Code 129.56 & AMR V, Section II
P162	IFR	840,926	25 PA Code 129.56 & AMR V, Section II
P163	IFR	815,172	25 PA Code 129.56 & AMR V, Section II
P164	IFR	816,371	25 PA Code 129.56 & AMR V, Section II

Storage Tanks Cont.

Source ID	Description*	Capacity (gallons)	CTG RACT Regulation
P198	VFR	315,436	25 PA Code 129.56 & AMR V, Section II
P199	VFR	314,782	25 PA Code 129.56 & AMR V, Section II
P200	VFR	312,077	25 PA Code 129.56 & AMR V, Section II
P201	VFR	313,882	25 PA Code 129.56 & AMR V, Section II
P202	VFR	216,331	25 PA Code 129.56 & AMR V, Section II
P203	VFR	216,331	25 PA Code 129.56 & AMR V, Section II
P204	IFR	1,264,372	25 PA Code 129.56 & AMR V, Section II
P205	IFR	510,742	25 PA Code 129.56 & AMR V, Section II
P206	IFR	509,983	25 PA Code 129.56 & AMR V, Section II
P207	IFR	511,025	25 PA Code 129.56 & AMR V, Section II
P208	IFR	509,305	25 PA Code 129.56 & AMR V, Section II
P209	IFR	500,614	25 PA Code 129.56 & AMR V, Section II
P210	IFR	510,762	25 PA Code 129.56 & AMR V, Section II
P211	IFR	489,980	25 PA Code 129.56 & AMR V, Section II
P212	VFR	509,189	25 PA Code 129.56 & AMR V, Section II
P213	IFR	266,663	25 PA Code 129.56 & AMR V, Section II
P214	VFR	289,802	25 PA Code 129.56 & AMR V, Section II
P215	IFR	281,774	25 PA Code 129.56 & AMR V, Section II
P216	IFR	267,219	25 PA Code 129.56 & AMR V, Section II
P217	VFR	511,150	25 PA Code 129.56 & AMR V, Section II
P218	VFR	510,164	25 PA Code 129.56 & AMR V, Section II
P219	VFR	509,300	25 PA Code 129.56 & AMR V, Section II
P220	VFR	510,457	25 PA Code 129.56 & AMR V, Section II
P221	IFR	490,637,	25 PA Code 129.56 & AMR V, Section II
P222	IFR	490,516	25 PA Code 129.56 & AMR V, Section II
P223	IFR	470,864	25 PA Code 129.56 & AMR V, Section II
P224	IFR	471,176	25 PA Code 129.56 & AMR V, Section II
P225	IFR	470,665	25 PA Code 129.56 & AMR V, Section II
P226	IFR	473,195	25 PA Code 129.56 & AMR V, Section II
P227	IFR	473,101	25 PA Code 129.56 & AMR V, Section II
P228	IFR	925,384	25 PA Code 129.56 & AMR V, Section II
P301	DS IFR	1,141,483	25 PA Code 129.56 & AMR V, Section II
P302	DS IFR	3,776,119	25 PA Code 129.56 & AMR V, Section II
P303	DS IFR	981,752	25 PA Code 129.56 & AMR V, Section II
P304	DS IFR	3,989,566	25 PA Code 129.56 & AMR V, Section II
P305	VFR	318,301	25 PA Code 129.56 & AMR V, Section II
P420	HFR	20,079	25 PA Code 129.57
P421	HFR	6,047	25 PA Code 129.57
P422	HFR	3,138	25 PA Code 129.57
P440	VFR	35,282	25 PA Code 129.57
P450	VFR	31,281	25 PA Code 129.57
P451	VFR	31,264	25 PA Code 129.57
P460	HFR	12,047	25 PA Code 129.57
P470	HFR	10,012	25 PA Code 129.57
P471	HFR	2,000	25 PA Code 129.57
P481	HFR	29,996	25 PA Code 129.57
P482	HFR	29,996	25 PA Code 129.57
P483	HFR	29,996	25 PA Code 129.57
P484	HFR	29,996	25 PA Code 129.57
P485	HFR	29,996	25 PA Code 129.57
P486	HFR	29,996	25 PA Code 129.57
P487	HFR	29,996	25 PA Code 129.57
P488	HFR	29,996	25 PA Code 129.57
P489	HFR	20,000	25 PA Code 129.57
P490	HFR	20,000	25 PA Code 129.57

*(*Note: The Description Codes are as follows:*

- *IFR – Internal Floating Roof*
- *FR – Fixed Roof*
- *VFR DSP- Vertical Fixed Roof, Distilled Spirits*
- *DS IFR – Double seal, Internal Floating Roof*
- *HFR -Horizontal Fixed Roof*
- *VFR – Vertical Fixed Roof)*

For storage tanks with capacities greater than 40,000 gallons, since each unit stores petroleum/organic products with a vapor pressure ≥ 1.5 psi and ≤ 11 psi, the RACT requirement is the installation of an external or an internal floating roof, as per the CTG rule 25 PA Code 129.56.

For storage tanks with capacities greater than or equal to 2,000 gallons but less than or equal to 40,000 gallons, since each unit stores petroleum/organic products with a vapor pressure > 1.5 psi, the RACT requirement is the existence of pressure relief valves which are maintained in good operating condition and which are set to release at various pressures, as per the CTG rule 25 PA Code 129.57.

Case-by-Case RACT Sources:

Fugitive Emissions

The following sources of VOC fugitive emissions from flanges, valves, and pumps leaks are subject to case-by-case 1-hour RACT requirements, per the SIP-approved RACT plan approval:

- P01 – Process Piping Flanges
  - Fuel/Material: Organic/Inorganic Compounds
- P02 – Process Piping Valves
  - Fuel/Material: Organic/Inorganic Compounds
- P03 – Process Piping Pumps
  - Fuel/Material: Organic/Inorganic Compounds

Under the SIP-approved RACT plan approval, the facility is required to monitor, detect, and repair leaks from all valves, pumps, and flanges processing all liquids, including non-VOC liquids. The SIP-approved 1-hr RACT plan approval includes the following conditions:

- *Condition 2E:*
  - "The implementation of a quarterly leak detection and repair program on all pumps, valves and flanges containing VOC;"
- *Condition 5A:*
  - "GATX [Kinder Morgan] shall monitor all valves, pumps, and flanges quarterly for visual leaks. GATX shall also monitor valves, pumps, and flanges which process organic liquid greater than or equal to 4 RVP for leaks of greater than 10,000 ppmv."

In addition to the case-by-case 1-hour RACT requirements per the SIP-approved RACT plan approval, the CTG regulation, AMR V Section XIII(1), also applies since it covers emissions from equipment leaks.

As per AMR V Section XIII(1), no person shall cause, suffer, allow or permit volatile organic compounds (VOC) to be emitted from leaking flanges, gaskets, seals, connections, joints, fittings or other process equipment components not involving moving parts, nor shall any person cause, suffer, allow or permit VOC to be emitted from leaking valves, pumps, compressors, safety pressure relief devices or other process equipment components involving moving parts such that:

- The VOC emission from any leaking process equipment component results in a VOC in air concentration of 10,000 parts per million by volume (ppmv), or greater, when measured by test methods approved by the Department.

However, since this CTG regulation does not require a quarterly LDAR program for the facility and is therefore not as stringent as/equivalent to the currently implemented case-by-case 1-hour RACT requirements, the LDAR program required by the SIP-approved 1-hr RACT plan approval must continue to be implemented. AMS is proposing to modify the existing case-by-case 1-hour RACT requirements. The modification aims to more accurately reflect actual operating scenarios at the facility.

AMS is proposing to modify condition 5A to require monitoring for VOC liquids only, which is consistent with condition 2E of the 1-hr RACT plan approval. Since monitoring non-VOC products does not affect VOC emissions, the proposed modification does not result in any increase in VOC emissions. Under the CAA, RACT is only required for the control of VOC and NOx emissions, as precursors of ozone. Thus, the modification is also consistent with the CAA.

AMS is proposing the following modification to the RACT plan approval:

- *Condition 5A Modification*:
  - "The Permittee shall monitor all valves, pumps, and flanges in VOC service quarterly for visual leaks for greater than 10,000 ppmv.

AMS is proposing the following additional recordkeeping activities to demonstrate compliance with VOC RACT conditions:

- The Permittee shall keep record of all quarterly visual leak inspections. Should any leaks greater than 10,000 ppmv be identified, the Permittee shall keep records of all corrective action taken.
- As a facility wide requirement, Kinder Morgan shall monitor and maintain a file containing all records and other data that are required to be collected to demonstrate compliance with VOC RACT requirements of 25 Pa Code 129.91-129.94 are met.
- As a facility wide requirement, data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.
- As a facility wide requirement, records shall be kept for at least five (5) years and shall be made available to AMS on request.

As stated above, since the CTG RACT regulation is just as stringent/equivalent to the case-by-case 1-hr RACT Requirements, AMS determines that the revisions to the SIP-approved RACT plan approval (as well as AMR V Section XIII) represent VOC RACT under the 1997 8-hour ozone standard for the fugitive emissions in Kinder Morgan.

Tank Truck/Tank Car Loading Operations:

"Description"

Kinder Morgan Liquid Terminals, LLC owns and operates various tank car /truck loading racks. Certain racks can be connected to the NAO Thermal Oxidation Unit whereas some racks can't be connected to the NAO Thermal Oxidation Unit at all. VOCs are transferred from the storage tanks into tank trucks and rail cars. The tank trucks and rail cars are loaded at several racks throughout the facility. Any organic material with a Reid Vapor Pressure (RVP) of four (4) psi or greater is controlled using the NAO Thermal Oxidation Unit operated in accordance with manufacturer's specifications. Any organic material with a RVP of less than 4 psi does not require control using the NAO Thermal Oxidation Unit.

A loading rack consists of multiple loading positions, which may be controlled or uncontrolled. The loading emissions from each position can be vented to atmosphere separately or combined with emissions from other controlled position(s) and brought to a common exhaust point, such as a control device. A controlled loading position is required when handling a product with an RVP $\geq$ 4.0 psi. The loading emission from other products with an RVP < 4.0 psi do not require controls, but can be loaded at a controlled loading rack. There are no physical changes proposed for the modification.

The SIP-approved 1-hr RACT plan approval includes the following case-by-case requirements for the tank car/truck loading racks:

- *Condition 2B(1):*
  - "The operation of the following equipment in accordance with the presumptive RACT requirements of 25 PA Code 129.93(c)(4):
    - NAO Thermal Oxidation Unit;"
- *Condition 2C:*
  - "Tank car/truck loading racks – A, B, E, F, M, & V shall comply with 25 PA Code 129.59;"
- *Condition 2D:*
  - "Tank car/truck loading racks – C, D, G, H, N, O, P, R, R-1, T, & X which are uncontrolled shall be limited to processing organic liquid with vapor pressure lower than 4 RVP;"
- *Condition 3A(1):*
  - "Tank car/truck loading racks – C, D, G, H, N, O, P, R, R-1, T, & X which are uncontrolled shall be limited to 129 tons of VOC per year."
- *Condition 5B*
  - "GATX [Kinder Morgan] shall monitor throughput of material processed and vapor pressures for all tanks, marine loading, and tank car/truck loading racks on a daily basis."

Since the case-by-case 1-hr RACT plan approval limits "uncontrolled" racks to organic liquids having a Reid Vapor Pressure (RVP) of less than 4.0 psi, the "controlled" racks which have the ability to load liquids with RVP greater than or equal to 4.0 psi are also subject to the following two (2) additional CTG Regulations:

- 25 PA Code 129.59(a)

- As per 25 PA Code 129.59 (a), a person may not cause or permit the loading of gasoline (defined in 25 PA Code 121.1, as petroleum distillate with a Reid Vapor Pressure (RVP) ≥ 4.0 psi and which is a liquid at standard temperature and pressure) into a vehicular tank from a bulk gasoline terminal unless the gasoline loading racks are equipped with a vapor collection and disposal system capable of processing volatile organic vapors and gases so that no more than 0.0668 pounds (30.3 grams) of gasoline (measured as propane) are emitted to the atmosphere for every 100 gallons (380 liters) of gasoline loaded.

- AMR V, Section V(a)
  - As per AMR V, Section V(a), no person shall load any organic material having a Reid vapor pressure of 4.0 pounds or greater into any tank truck, tank car, or trailer from any loading facility from which 20,000 gallons or more of such organic material are loaded in any one day from this facility unless this facility is equipped with a vapor recovery system properly installed, well maintained, in operation, and approved by the Department. Such a vapor recovery system shall be capable of collecting the organic materials emitted from the filling operation and disposing of these emissions so as to prevent their release to the atmosphere.

As per the above CTG conditions, 25 PA Code 129.59(a) is more stringent than AMR V, Section V(a). Regardless, both of the regulations require connection to the vapor recovery system, i.e. the NAO Thermal Oxidizer. The thermal oxidizer is a process in which the hydrocarbons in a gas stream are combusted to form carbon dioxide and water at an elevated temperature. The thermal oxidation is governed by temperature, time, and turbulence. The "controlled" racks are connected to the NAO Thermal Oxidizer.

The VOC emissions from tank truck/ tank car loading operations are therefore covered by either the case-by-case 1-hr RACT Plan approval conditions or the CTG Regulation 25 PA Code 129.59(a) and AMR V, Section V(a), as specified in the following table:

Tank Truck/Tank Car Loading Operations

Control Status	Load Rack	CTG RACT Regulation or Case-by-Case 1-hr RACT
Controlled (By NAO Thermal Oxidizer)	A Rack	25 PA Code 129.59(a) & AMR V, Section V(a)
	D Rack	26 PA Code 129.59(a) & AMR V, Section V(a)
	E Rack	28 PA Code 129.59(a) & AMR V, Section V(a)
	F Rack	29 PA Code 129.59(a) & AMR V, Section V(a)
	M Rack	33 PA Code 129.59(a) & AMR V, Section V(a)
Uncontrolled	A Rack	Case-by-Case 1-hr RACT
	D Rack	Case-by-Case 1-hr RACT
	E Rack	Case-by-Case 1-hr RACT
	F Rack	Case-by-Case 1-hr RACT
	M Rack	Case-by-Case 1-hr RACT
	C Rack	Case-by-Case 1-hr RACT
	V Rack	Case-by-Case 1-hr RACT
	P Rack	Case-by-Case 1-hr RACT
	N Rack	Case-by-Case 1-hr RACT
	B Rack	Case-by-Case 1-hr RACT
	R Rack	Case-by-Case 1-hr RACT
	R1 Rack	Case-by-Case 1-hr RACT
	T Rack	Case-by-Case 1-hr RACT
	G Rack	Case-by-Case 1-hr RACT
	H Rack	Case-by-Case 1-hr RACT
	O Rack	Case-by-Case 1-hr RACT
	DSP Rack	Case-by-Case 1-hr RACT
	X Rack	Case-by-Case 1-hr RACT

Tank Truck/Tank Car Loading Operations:
"1-hr RACT Modification"

Over the years, various changes that did not result in an increase of potential emissions have been made to the racks at the facility. In order to allow the facility more flexibility in regard to their operations, the changes were approved by AMS. Such changes are listed below.

- Under AMS Plan Approval No. 02139, AMS approved the following:
  - Disconnect the existing vapor recovery line from loading Rack V
    - Rack V no longer have vapor control loading capability as it will not vent to the NAO Thermal Oxidation Unit
    - Rack V will only load chemicals with an RVP less than 4.0 psia that do not require vapor controls
  - Reroute the vapor recovery line to loading Rack D
    - Rack D will now have vapor control loading capability since emissions from loading Rack D can vent to the existing NAO Thermal Oxidation Unit.
    - Rack D is still capable of loading chemicals with an RVP less than 4.0 psia that do not require vapor controls
- Under AMS Plan Approval No. 08211, AMS approved the following:
  - Two (2) existing vapor control loading positions at Racks X and B
    - Racks X and B no longer have vapor control loading capability as they will not vent to the NAO Thermal Oxidation Unit
    - Racks X and B will only load chemicals with an RVP less than 4.0 psia that do not require vapor controls
  - The relocation of one (1) of the control loading positions to Rack F
    - Rack F has increased loading capability for controlled products
    - Rack F is still capable of loading chemicals with an RVP less than 4.0 psi that do not require vapor controls

In order to continue to allow the facility more flexibility as to which liquids are loaded into which racks and to clarify the term "controlled loading rack" AMS is proposing a 1-hr RACT modification. It allows the facility to load liquids that do not need to be controlled at any rack but for uncontrolled loading, the RVP has to be less than 4.0 and the uncontrolled loading at the facility has to be limited to 129 tons per year.

Both before the 1-hr RACT modification and after the 1-hr RACT modification, all liquids loaded with RVP ≥ 4.0 psi are loaded at racks which are controlled by the NAO Thermal Oxidation Unit run in accordance with manufacturer's specifications (as is required under 25 PA Code 129.93 per the description above).

Though the racks have different loading capacities and the facility has the flexibility to load and control different racks, as is stated in the case-by-case 1-hr RACT plan approval Condition 3(A)(1), all liquids loaded with RVP < 4.0 psi are limited to the 129 tons of VOC per year. Since this emission limitation exists, there can be no increase in VOC emissions. Therefore, the proposed modification does not result in any increase in VOC emissions at the controlled or uncontrolled racks.

To demonstrate how there is no increase emissions, the calculations provided below have been provided to represent the current case-by-case 1-hr RACT scenario: (Note: these are potential emissions and do not reflect actual operations)

Controlled Loading:

- Controlled Positions at Racks A, B, E, F, M, V:
  - In order to determine the potential emissions, Kinder Morgan determined that the highest vapor chemical that can be stored requiring controls was 11 psia at actual storage conditions. This vapor pressure level is based on 25 PA Code 129.56(a)(1). The material that closely matches this criterion is Gasoline RVP 15. Kinder Morgan does not handle Gasoline RVP 15 but used it to determine potential emissions. The pumping rate is base on the maximum capacity of the NAO Thermal Oxidation Unit. This equates to 1, 421 gallons per minute.
- Using AP-42 Section 5.2, the potential controlled emissions are therefore determined to be 37 tons per year of VOC per year.

Uncontrolled Loading:

- Uncontrolled Positions at Racks A, B, E,F, M, V:
  - Racks A, B, E, F, M, and V have control capabilities; however, not all loading positions are connected to the NAO Thermal Oxidation Unit since these positions doe not load materials that

are required to have control (e.g. benzene NESHAP) or load materials with a vapor pressure great than 4 psia RVP. Although these uncontrolled positions were not listed under the 129 ton per year limit for the uncontrolled racks in the RACT permit, Kinder Morgan always considered them part of the limit. If one strictly followed the conditions listed in the permit, Kinder Morgan could load at these positions without limitation. Based on the permit, Kinder Morgan could load materials that have a RVP less than four at each uncontrolled position. Using a material that closely matches this criterion is carbon tetrachloride. Kinder Morgan does not handle carbon tetrachloride but used it to determine potential emissions. Using a maximum pumping rate of 450 gallons per minutes at each uncontrolled position and a total of 25 uncontrolled positions, the total pumping rate is 675,000 gallons per hour.
    - Using AP-42 Section 5.2, the potential emissions are therefore determined to be 7,687 tons of VOC per year.
- Uncontrolled Positions at Racks C, D, G, H, N, O P, R-1, T, X
    - These racks do not have vapor control capability, meaning a vapor line is not connected to any loading position.
    - The case-by-case 1-hr RACT plan approval limits the missions from these racks to 129 tons of VOC per year. Therefore, this is considered to be potential to emit for these racks.
- The total emissions based on the strict interpretation of the conditions is 7,687 tpy + 129 tpy = 7,853 tons of VOC per year at the uncontrolled positions.

The calculations provided below have been provided to represent the modifications to the case-by-case 1-hr RACT scenario: (Note: these are potential emissions and do not reflect actual operations)

Controlled Loading:

- Controlled Positions at Racks A, B, E, F, M, V:
    - In order to determine the potential emissions, Kinder Morgan determined that the highest vapor chemical that can be stored requiring controls was 11 psia at actual storage conditions. This vapor pressure level is based on 25 PA Code 129.56(a)(1). The material that closely matches this criterion is Gasoline RVP 15. Kinder Morgan does no handles Gasoline RVP 15 but used it to determine potential emissions. The pumping rate is base on the maximum capacity of NAO Thermal Oxidation Unit. This equates to 1, 421 gallons per minute.
- Using AP-42 Section 5.2, the potential controlled emissions are therefore determined to be 37 tons per year of VOC per year.

Uncontrolled Loading:

- As a result of the clarifications, the permit not clearly states that all uncontrolled loading positions are limited to 129 tons of VOC pear year.

Therefore, the total potential emissions after the proposed modification to the case-by-case 1-hr RACT plan approval are 37 tpy + 129 tpy = **166 tons** of VOC per year total. This is a significant decrease in potential emissions in comparison to the current SIP approved case-by-case 1-hr RACT plan approval conditions rendering the potential to emit 37 tpy + 7,853 tpy = **7,890 tons** of VOC per year total.

Loading Emissions Calculations

Rack ID	Product*	Throughput (Gallons/Hour)	Hours	Throughput (Gallons/Year)	Chemical Vapor Pressure (psia)	Molecular Weight	CE% **	Saturation Factor	Annual Avg. Temp. (Deg. F)	Emissions Factor (lb/1000 gals)	Emissions (tons)
Controlled Loading	Gasoline RVP 15	85,260	8,760	746,877,600	6.45	66	98	0.5	60	0.1	37
Uncontrolled Positions at Racks A, B, E, F, M, V	Carbon Tetrachloride	675,000	8,760	5,913,000,000	1.412	153.84	0	0.5	60	2.6	7,687
Uncontrolled Positions at Racks C, D, G, H, N, O P, R-1, T, X	N/A										129

**Kinder Morgan does not currently handle or load this chemical but it is being used for PTE estimates*
*** Based on performance testing conducted, the oxidizer has shown to have an efficiency of 99+%. However, 98% is used for PTE purposes.*

Given the aforementioned PTE analysis, cost effectiveness analysis, and given that the modifications to the SIP Approved case-by-case 1-hr RACT result in a significant decrease in potential VOC emissions, AMS is proposing the following modifications to the 1-hr RACT:

- *Condition 2C Modification:*
    - "Volatile Organic Compounds (VOC) with a Reid Vapor Pressure greater than or equal to 4.0 psi shall be loaded at racks A, E, F, M, or D and shall comply with the requirements of 25 PA Code 129.59(a);"
- *Condition 2D Modification:*
    - "All volatile organic liquids loaded at uncontrolled rack positions at the facility must have a RVP less than 4.0;"
- *Condition 3A(1) Modification:*

- "All uncontrolled tank car/truck loading positions at the facility shall be limited to 129 tons of VOC per year."

Tank Truck/Tank Car Loading Operations:
"8-Hr. RACT Analysis"

In order to propose the 1-hr RACT as 8-hr RACT, an economic evaluation has also been performed to evaluate the feasibility of adding a control device while loading VOC materials with an RVP < 4.0 psi. The following provides the associated analysis:

Possible Control Rankings:

Control	Estimated Effectiveness*
Thermal Oxidation	95-98 %
Carbon Adsorption	85-95%
Bioreactor	60-99%
Scrubbers	50-98%
Condensation	50-90%

**Does not include capture efficiency*

Technically Feasibility Evaluation:

- Thermal Oxidation
  - As is described above, Thermal Oxidation is a process in which the hydrocarbons in a gas stream are combusted to form carbon dioxide and water at an elevated temperature. Thermal Oxidation is governed by temperature, time, and turbulence. In order to achieve effective combustion the organic must be raised 100 degree Fahrenheit or more above its ignition temperature and held at that for good oxidation to occur. An auxiliary fuel is required to ensure the temperature is maintained for proper combustion.
  - There are essentially two (2) types of incinerators: thermal and catalytic. Each type is considered technically feasible for the marine loading operation. However, for costs analysis purposes, thermal incineration is being considered since the relative cost of the two are similar.
- Carbon Adsorption
  - Adsorption is where gas molecules are passed through a bed or solid particles, then diffuses from the gas stream to the bed, and held on the media by attractive forces. Adsorptive capacity of the solid for the gas tends to increase with the gas phase concentration, molecular weight, diffusivity, polarity, and boiling point.
  - Typical adsorbents media in use include activated carbon, silica gel, activated alumina, synthetic zeolites, fuller's earth, and other clays. This RACT analysis is oriented toward the use of activate carbon, a commonly used adsorbent for VOCs. Carbon adsorption is effective when materials have a molecular weight of 50 or greater.
  - Carbon adsorption is considered technically infeasible for the operation since it would not be effective on all materials handled at the dock. Ethanol is loaded into vessels in addition to other materials. The molecular weight of ethanol is 46, thus making carbon adsorption infeasible.
- Bioreactor
  - There are several different types of bioreactors from soil beds or bio-filters to bio-trickling filters, and bio-scrubbers. Typically used for odor control, bioreactors can be used to oxidize VOCs. For a bioreactor to be effective, one needs a consistent stream and maintain temperature above 60 degrees Fahrenheit. The marine vessel operation at Kinder Morgan is intermittent and the climates average annual temperature is below 60 degrees Fahrenheit. While there are other factors to consider, this control option is considered technically infeasible due to the intermittent nature of the operation and the climate of the area.
- Scrubbers
  - Scrubbers use a process called absorption to remove pollutants from an air stream to a liquid stream. The absorption processes the organics in the air stream are dissolved in a liquid solvent. The limiting factors as a primary control technique deal with the availability of a suitable solvent and the solubility of the organic. In this case, the terminal would require different solvents to handle the varying material handled. Based on the organics in the air stream requiring different absorption media this control option is considered technically infeasible.
- Condensation
  - Refrigeration units are basically "heat pumps," absorbing heat on the "cold side" of the system and releasing heat on the "hot side" of the system.
  - A refrigerated condenser is a viable option if:
    - The air stream is saturated with the organic compound
    - The organic vapor containment system limits air flow

- Required air flow does no overload a refrigeration system with heat
- Only one organic compound is emitted

- Since the marine vessel loading operation is only considered to be 50 percent saturated and there are multiple organic compounds, this control option is considered infeasible.

1. Thermal Oxidizer Technical Feasibility Cost Analysis: "Per Loading Rack Position"

To determine the cost effectiveness of the technically feasible control option, a thermal oxidation unit, a cost analysis was conducted and is presented below. The capital cost for the thermal oxidizer is based on a vendor quote for another project (see Attachment #1), and is presented in the following tables. Below is a cost analysis for control of each individual uncontrolled tank truck and rail car loading position.

Per Loading Rack Position – Total Capital Investment

Direct Cost		
Purchsed Equipment*	$	181,203.85
Instrumentation	-	
Sales Tax	$	10,872.23
Freight	$	9,060.19
Purchased Equipment Cost	**$**	**201,136.27**
Direct Installation Costs		
Foundations & Supports	$	16,090.90
Handling & Erection	$	28,159.08
Electrical	$	8,045.45
Piping	$	4,022.73
Insulation for ductwork	$	2,011.36
Painting	$	-
Direct Installation Costs	**$**	**58,329.52**
Site Preparation	$	2,011.36
Total Direct Cost	**$**	**261,477.15**
Indirect Cost		
Engineering	$	20,113.63
Construction and field expenses	$	10,056.81
Contractor fees	$	20,113.63
Start-up	$	4,022.73
Performance test	$	7,500.00
Total Indirect Cost	**$**	**61,806.80**
Total Capital Investment	**$**	**323,283.95**

**See "Attachment 3" for vendor quote*

Per Loading Rack Position – Total Annual Cost

Annual Hours of Operation		3,675
Direct Annual Costs		
Operating Labor (0.5 hr/shift @ $18/hr)	$	4,134.38
Supervisor (15% of operator)	$	620.16
Operating Materials	-	
Maintenance		
Labor (0.5 hr/shift $25/hr)	$	6,843.75
Materials (100% of maint. Labor)	$	6,843.75
Natural Gas (1.16 per therm)	$	106,596.95
Electricity (0.162/kwh)	$	3,255.25
Total	**$**	**128,294.24**
Indirect Annual Cost		
Overhead (60% of sum of operating supervisor, maint.	$	11,065.22
Administrative Charges (2% TCI - 9,650 17,800)	$	6,465.68
Property Taxes (1% TCI - 4,830 8,900)	$	3,232.84
Insurance (1% TCI - 4,830 122,700)	$	3,232.84
Capital Recovery (7% over 10 years)	$	46,035.63
Total Indirect Annual Cost	**$**	**70,032.21**
Total Annual Cost	**$**	**198,326.45**

Per Loading Rack Position – Cost Summary

Source	Total Capital Investment	Annual Operating Cost
Per Loading Rack Position	$ 323,283.95	$ 198,326.45

Based on a vendor quote for another project, the capital cost for the thermal oxidizer is estimated to be $323,283.96 and the annual operating costs are $198,326.45 per year. The costs estimates are consistent with the EPA Air Pollution Control Costs Manual, Version 6. The annual costs include operating and maintenance labor, fuel and electrical costs, and a capital depreciation of 7 percent over 10 years. The costs of the technically feasible controls are based on vendor quotes and readily available literature.

In order to determine baseline emissions, theoretically a position could potentially emit the full 129 tpy on its own, but it would not provide Kinder Morgan operational flexibility for other customers. Kinder Morgan has determined the baseline for an individual loading position to be 70 tons per year. As a "for hire" storage terminal, this would cover a huge customer of material with an RVP a little below 4.0 psi while simultaneously leaving from for other large customers under the facility's 129 tons per year limit for uncontrolled loading racks. Therefore, the 70 ton per year limitation at each individual tank truck and rail car loading rack position (in addition to maintaining the overall limitation of 129 tons per year for the combined uncontrolled loading rack positions) yields a cost effectiveness greater than the $2,500 benchmark and the technically feasible control for each individual tank truck and rail car loading positions does not show to be cost effective. In reality, the actual emissions at all uncontrolled loading positions at the facility are typically less than 1 ton per year.

Per Loading Rack Position – Technical Feasibility

Rank	Control Option	Baseline VOC (tpy)	Estimated Reduction in Emissions*	Emissions after Control (tpy)	Cost Effectiveness ($/ton)	Incremental Cost Effectiveness ($)
1	Thermal Oxidation	70	90%	7	$ 3,148.04	N/A

**Based on NJDEP RACT requirements for loading volatile organic compounds 7:27 N.J.A.C. Subchapter 16*

2. Thermal Oxidizer Technical Feasibility Cost Analysis: "All Uncontrolled Loading Rack Positions"

To determine the cost effectiveness of the technically feasible control option, a thermal oxidation unit, a cost analysis was conducted and is presented below. The capital cost for the thermal oxidizer is based on a vendor quote for another project (see Attachment #1), and is presented in the following tables. Below is a cost analysis for control of all uncontrolled tank truck and rail car loading positions.

All Uncontrolled Loading Rack Positions – Total Capital Investment

Direct Cost		
Purchsed Equipment*	$	2,176,565.57
Instrumentation	-	
Sales Tax	$	130,593.93
Freight	$	108,828.28
Purchased Equipment Cost	**$**	**2,415,987.78**
Direct Installation Costs		
Foundations & Supports	$	193,279.02
Handling & Erection	$	338,238.29
Electrical	$	96,639.51
Piping	$	120,799.39
Insulation for ductwork	$	24,159.88
Painting	$	-
Direct Installation Costs	**$**	**773,116.09**
Site Preparation	$	24,159.88
Total Direct Cost	**$**	**3,213,263.75**
Indirect Cost		
Engineering	$	241,598.78
Construction and field expenses	$	120,799.39
Contractor fees	$	241,598.78
Start-up	$	48,319.76
Performance test	$	7,500.00
Total Indirect Cost	**$**	**659,816.71**
Total Capital Investment	**$**	**3,873,080.46**

**See "Attachment 2" for vendor quote*

All Uncontrolled Loading Rack Positions – Total Annual Cost

Annual Hours of Operation		8,760
Direct Annual Costs		
Operating Labor (0.5 hr/shift @ $18/hr)	$	9,855.00
Supervisor (15% of operator)	$	1,478.25
Operating Materials	-	
Maintenance		
Labor (0.5 hr/shift $25/hr)	$	6,843.75
Materials (100% of maint. Labor)	$	6,843.75
Natural Gas (1.16 per therm)	$	16,004,541.95
Electricity (0.162/kwh)	$	7,759.46
Total	**$**	**16,037,322.16**
Indirect Annual Cost		
Overhead (60% of sum of operating supervisor, maint.	$	15,012.45
Administrative Charges (2% TCI - 9,650 17,800)	$	77,461.61
Property Taxes (1% TCI - 4,830 8,900)	$	38,730.80
Insurance (1% TCI - 4,830 122,700)	$	38,730.80
Capital Recovery (7% over 10 years)	$	551,526.66
Total Indirect Annual Cost	**$**	**721,462.32**
Total Annual Cost	**$**	**16,758,784.48**

All Uncontrolled Loading Rack Positions – Cost Summary

Source	Total Capital Investment	Annual Operating Cost
All Uncontrolled Loading Rack Positions	$ 3,873,080.46	$ 16,758,784.48

Based on a vendor quote for another project, the capital cost for the thermal oxidizer is estimated to be $3,873,080.46 and the annual operating costs are $16,758,784.48 per year. The costs estimates are consistent with the EPA Air Pollution Control Costs Manual, Version 6. The annual costs include operating and maintenance labor, fuel and electrical costs, and a capital depreciation of 7 percent over 10 years. The costs of the technically feasible controls are based on vendor quotes and readily available literature.

The 129 tons per year baseline emissions is taken from the SIP-approved 1-hr RACT.

All Uncontrolled Loading Rack Positions – Technical Feasibility

Rank	Control Option	Baseline VOC (tpy)	Estimated Reduction in Emissions*	Emissions after Control (tpy)	Cost Effectiveness ($/ton)	Incremental Cost Effectiveness ($)
1	Thermal Oxidation	129	90%	12.9	$ 144,347.84	N/A

**Based on NJDEP RACT requirements for loading volatile organic compounds 7:27 N.J.A.C. Subchapter 16*

Both analyses show that based on the current permitted values the only technically feasible control, the thermal oxidation unit, for all uncontrolled loading rack positions and for each individual tank truck and rail car loading position is not cost effective and thus no control device is required.

Given the aforementioned technically feasible control ranking analyses, AMS is proposing the following addition to the 1-hr RACT (in conjunction with the previously outlined 1-hr RACT modifications above):

- *Condition 3B(1) NEW Addition:*
  - "Each individual uncontrolled tank car/truck loading position at the facility shall be limited to 70 tons of VOC per year."

AMS is proposing the following additional recordkeeping activities to demonstrate compliance with VOC RACT conditions:

- The Permittee shall keep daily records of throughputs of each material processed and the corresponding vapor pressures for all tanks, marine loading, and tank car/truck loading racks.
- As a facility wide requirement, Kinder Morgan shall monitor and maintain a file containing all records and other data that are required to be collected to demonstrate compliance with VOC RACT requirements of 25 Pa Code 129.91-129.94 are met.
- As a facility wide requirement, data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.
- As a facility wide requirement, records shall be kept for at least five (5) years and shall be made available to AMS on request.

AMS therefore determines that the revised 1-hour case-by-case requirements continue to represent VOC RACT under the 1997 8-hour ozone standard for the tank truck/tank car loading operations in Kinder Morgan.

Marine Vessel Loading Operations

The marine vessel loading at Kinder Morgan is similar to the tank trucks and rail cars except that only cumene vapors are loaded utilizing a separate Marine Vapor Combustor.

The SIP-approved 1-hr RACT plan approval includes the following case-by-case requirements:

- *Condition 2F:*
  - "The marine vessel loading shall not process petroleum distillate with vapor pressures greater than 4 RVP;"
- *Condition 3A(2):*
  - "The operation of the marine vessel loading shall be limited to 59 tons of VOC per year."
- *Condition 5B*
  - "GATX [Kinder Morgan] shall monitor throughput of material processed and vapor pressures for all tanks, marine loading, and tank car/truck loading racks on a daily basis."

Possible Control Rankings:

Control	Estimated Effectiveness*
Thermal Oxidation	95-98 %
Carbon Adsorption	85-95%
Bioreactor	60-99%
Scrubbers	50-98%
Condensation	50-90%

**Does not include capture efficiency*

The existing Marine Vapor Combustor does not have capacity to handle/vent all of the VOC materials with an RVP < 4.0 psi, therefore an addition thermal oxidation unit would have to be purchased by the facility.

Technically Feasibility Evaluation:

- Thermal Oxidation
  - As is described above, Thermal Oxidation is a process in which the hydrocarbons in a gas stream are combusted to form carbon dioxide and water at an elevated temperature. Thermal Oxidation is governed by temperature, time, and turbulence. In order to achieve effective combustion the organic must be raised 100 degree Fahrenheit or more above its ignition temperature and held at that for good oxidation to occur. An auxiliary fuel is required to ensure the temperature is maintained for proper combustion.
  - There are essentially two (2) types of incinerators: thermal and catalytic. Each type is considered technically feasible for the marine loading operation. However, for costs analysis purposes, thermal incineration is being considered since the relative cost of the two are similar.
- Carbon Adsorption
  - Adsorption is where gas molecules are passed through a bed or solid particles, then diffuses from the gas stream to the bed, and held on the media by attractive forces. Adsorptive capacity of the solid for the gas tends to increase with the gas phase concentration, molecular weight, diffusivity, polarity, and boiling point.
  - Typical adsorbents media in use include activated carbon, silica gel, activated alumina, synthetic zeolites, fuller's earth, and other clays. This RACT analysis is oriented toward the use of activate carbon, a commonly used adsorbent for VOCs. Carbon adsorption is effective when materials have a molecular weight of 50 or greater.
  - Carbon adsorption is considered technically infeasible for the operation since it would not be effective on all materials handled at the dock. Ethanol is loaded into vessels in addition to other materials. The molecular weight of ethanol is 46, thus making carbon adsorption infeasible.
- Bioreactor
  - There are several different types of bioreactors from soil beds or bio-filters to bio-trickling filters, and bio-scrubbers. Typically used for odor control, bioreactors can be used to oxidize VOCs. For a bioreactor to be effective, one needs a consistent stream and maintain temperature above 60 degrees Fahrenheit. The marine vessel operation at Kinder Morgan is intermittent and the climates average annual temperature is below 60 degrees Fahrenheit. While there are other factors to consider, this control option is considered technically infeasible due to the intermittent nature of the operation and the climate of the area.
- Scrubbers
  - Scrubbers use a process called absorption to remove pollutants from an air stream to a liquid stream. The absorption processes the organics in the air stream are dissolved in a liquid solvent. The limiting factors as a primary control technique deal with the availability of a suitable solvent

and the solubility of the organic. In this case, the terminal would require different solvents to handle the varying material handled. Based on the organics in the air stream requiring different absorption media this control option is considered technically infeasible.

- Condensation
  - Refrigeration units are basically "heat pumps," absorbing heat on the "cold side" of the system and releasing heat on the "hot side" of the system.
  - A refrigerated condenser is a viable option if:
    - The air stream is saturated with the organic compound
    - The organic vapor containment system limits air flow
    - Required air flow does no overload a refrigeration system with heat
    - Only one organic compound is emitted
  - Since the marine vessel loading operation is only considered to be 50 percent saturated and there are multiple organic compounds, this control option is considered infeasible.

1. Thermal Oxidation Technical Feasible Cost Analysis: "Marine Vessel Loading"

To determine the cost effectiveness of the technically feasible control option, a thermal oxidation unit, a cost analysis was conducted and is presented below. The capital cost for the thermal oxidizer is based on a vendor quote for another project (see Attachment #1), and is presented in the tables below.

Marine Vessel Loading – Total Capital Investment

Direct Cost		
Purchsed Equipment*	$	522,950.94
Instrumentation	-	
Sales Tax	$	31,377.06
Freight	$	26,147.55
Purchased Equipment Cost	**$**	**580,475.55**
Direct Installation Costs		
Foundations & Supports	$	46,438.04
Handling & Erection	$	81,266.58
Electrical	$	23,219.02
Piping	$	11,609.51
Insulation for ductwork	$	5,804.76
Painting	$	-
Direct Installation Costs	**$**	**168,337.91**
Site Preparation	$	5,804.76
Total Direct Cost	**$**	**754,618.22**
Indirect Cost		
Engineering	$	58,047.56
Construction and field expenses	$	29,023.78
Contractor fees	$	58,047.56
Start-up	$	11,609.51
Performance test	$	7,500.00
Total Indirect Cost	**$**	**164,228.41**
Total Capital Investment	**$**	**918,846.63**

**See "Attachment 1" for vendor quote*

Marine Loading Operations – Total Annual Cost

Annual Hours of Operation		1,076
Direct Annual Costs		
Operating Labor (0.5 hr/shift @ $18/hr)	$	1,210.50
Supervisor (15% of operator)	$	181.58
Operating Materials	-	
Maintenance		
Labor (0.5 hr/shift $25/hr)	$	6,843.75
Materials (100% of maint. Labor)	$	6,843.75
Natural Gas (1.16 per therm)	$	117,973.07
Electricity (0.162/kwh)	$	953.10
Total	**$**	**134,005.75**
Indirect Annual Cost		
Overhead (60% of sum of operating supervisor, maint. Labor, & maint. Materials)	$	9,047.75
Administrative Charges (2% TCI - 9,650 17,800)	$	18,376.93
Property Taxes (1% TCI - 4,830 8,900)	$	9,188.47
Insurance (1% TCI - 4,830 122,700)	$	9,188.47
Capital Recovery (7% over 10 years)	$	130,843.76
Total Indirect Annual Cost	**$**	**176,645.38**
Total Annual Cost	**$**	**310,651.13**

Marine Loading Operations – Cost Summary

Source	Total Capital Investment	Annual Operating Cost
Marine Vessel Loading	$ 918,846.63	$ 310,651.13

Based on a vendor quote for another project, the capital cost for the thermal oxidizer is estimated to be $918,846.63 and the annual operating costs are $310,651.13 per year. The costs estimates are consistent with the EPA Air Pollution Control Costs Manual, Version 6. The annual costs include operating and maintenance labor, fuel and electrical costs, and a capital depreciation of 7 percent over 10 years. The costs of the technically feasible controls are based on vendor quotes and readily available literature.

Marine Loading Operations – Technical Feasibility

Rank	Control Option	Baseline VOC (tpy)	Estimated Reduction in Emissions*	Emissions after Control (tpy)	Cost Effectiveness ($/ton)	Incremental Cost Effectiveness ($)
1	Thermal Oxidation	59	83%	10.03	$ 6,343.70	N/A

**Includes 85% capture efficiency based on Emission Estimation Protocol for Petroleum Refineries, Seciton 9, Table 9-5, 2011, Pag-9-7*

Based on the current permitted values the technically feasible controls for marine loading are not cost effective and thus no control device is required.

AMS is proposing the following additional recordkeeping activities to demonstrate compliance with VOC RACT conditions:

- The Permittee shall keep daily records of throughputs of each material processed and the corresponding vapor pressures for all tanks, marine loading, and tank car/truck loading racks.
- As a facility wide requirement, Kinder Morgan shall monitor and maintain a file containing all records and other data that are required to be collected to demonstrate compliance with VOC RACT requirements of 25 Pa Code 129.91-129.94 are met.
- As a facility wide requirement, data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.
- As a facility wide requirement, records shall be kept for at least five (5) years and shall be made available to AMS on request.

Therefore, AMS determines that the SIP Approved 1-hour case-by-case requirements continue to represent VOC RACT under the 1997 8-hr ozone standard for the marine vessel loading operations in Kinder Morgan. AMS is proposing no modification to the existing case-by-case 1-hr RACT plan approval conditions.

De Minimis Sources:

The following sources are sources with de minimis emissions of VOC and thus RACT is not applicable, as is specified in the “Comment” column of the table below:

Air Compressors

Source	Description	Capacity (hp)	Fuel Burned	Comment
AC-01	Air Compressor 1	48	Diesel	N/A -De Minimis (<1 ton/year VOC emitted)
AC-02	Air Compressor 2	48	Diesel	N/A - De Minimis (<1 ton/year VOC emitted)

No RACT requirement is necessary as the VOC PTE for each of these sources is less than 1 ton per year and are therefore considered de minimis.

Soil Remediation

Source ID	Source Description	Comment
SVE-01	Soil Vapor Extraction System with CatOx (Located at Philadelphia Regional Port)	N/A - De Minimis (<2.7 ton/year VOC emitted)

No RACT requirement is necessary as the VOC PTE for each of these sources is less than 2.7 tons per year and are therefore considered de minimis. Additionally, all vapors from the vapor extraction system shall pass through the catalytic oxidizer, of which shall be operated in accordance with good engineering practice, prior to discharge.

Cleaning & Degassing Operations

Source ID	Source Description	Comment
P700	Tank Cleaning and Degassing	N/A - De Minimis (<1.8 ton/year VOC emitted)

No RACT requirement is necessary as the VOC PTE for each of these sources is less than 1.8 tons per year and are therefore considered de minimis.

In addition, the following "insignificant sources" on the Title V Operating Permit V95-044 have minimal VOC emissions, for which is determined that RACT is not applicable:

Sand blasting of tanks, Painting of tanks, Sump tank, Catch basins, Two oil water separator (Receives <200 gallons of organic materials per day, Drumming, Steam cleaning of equipment, Chemical dryers, Pipe cleaning, Flushing of tanks with incoming products, Fire equipment, Mobile tanks (500 gallons each), Tanks 1 (Emergency containment tank), Tanks 2 and 3 (Emergency containment tank), Tank no. 471 (#2 oil for the vapor incinerator), Tank no. 420 (#2 oil for the boilers), and DSP fabric filter (Used by Tank 055 to protect workers)

Conclusions and Recommendations:

All VOC emitting sources in the facility are covered by presumptive, CTG rule, or case-by-case 1-hr RACT. As is mentioned above, AMS proposes accepting the modifications to the case-by-case 1-hr RACT listed above. AMS proposes adding the 70 tpy limit for uncontrolled individual tank truck/ rail car rack position loading, and AMS proposes 1-hr RACT, including the modifications above, as 8-hr RACT.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Biji Pandisseril & Edward Wiener

Date: August 29, 2014

Subject: 1997 8-Hour RACT Analysis for Philadelphia Gas Works- Richmond (PLID # 04922)

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone National Ambient Air Quality Standards (NAAQS). This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Philadelphia Gas Works (PGW) - Richmond Plant owns and operates a natural gas utility at 3100 East Venango Street in Philadelphia, Pennsylvania.

Applicability for NOx and VOC RACT:

PGW Richmond is a major source of NOx having potential NOx emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT under the 1997 8-hour ozone NAAQS. The facility is not a major source of VOC having potential VOC emissions of less than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT under the 1997 8-hour ozone NAAQS.

The facility is subject to RACT under the 1-hour ozone NAAQS. As a result of a 1-hour RACT determination, AMS issued the1-hour RACT Plan Approval (PA Permit Number 51-4922) dated July 26, 1999 for PGW - Richmond, which was approved by EPA as part of the State Implementation Plan (SIP) on October 31, 2001 (66 FR 54947).

Process Descriptions:

The emissions units in PGW Richmond include the following: six (6) Liquefied Natural Gas (LNG) vaporizer heaters between 94.1 and 105.0 MMBTU/hr, five (5) boiler/heaters of 11 MMBTU/hr or less(H-2 Boiloff Heater, H-3 Regen Gas Heater, Uniflux/Exotherm (26), GasMaster Boiler (19A-1), and Gas Master Boiler (19B-1)), four (4) simple cycle combustion turbines of 13.7 MMBTU/hr or less (two Solar Gas Turbine compressor and two Solar gas turbine electric generators), two (2) 170 HP emergency generators,, and three (3) Catrepillar 295 HP engines for fire pumps. These are the only NOx emission sources at the facility.

RACT Analysis:

Shut Down Units
At the time of the 1-hour RACT analysis, the facility also had four Clark engines, two Clark Stand-by engines, two Ingersoll-Rand stand-by boil-off compressors, two Kewanee boilers, two facility heaters, and two AO Smith Under-tank heating system, but since then these sources have shut down are not listed in the current Title V operating permit for the facility (No. V11-034).

Case-by-case RACT

The four Clark engines were subject to case-by-case RACT requirements under 1-hour RACT. These requirements are no longer applicable as these units have been shut down and permanently removed from the facility.

AMS is requesting to remove the applicable requirements for these units from the 1-hour RACT plan approval.

Presumptive RACT

In accordance, with 25 PA Code 129.93 (a) all of the remaining sources at the facility are subject to presumptive RACT limitations.

The facility complies with the presumptive RACT requirements of 25 PA Code 129.93(c)(5) for the large LNG Vaporizer Heaters by operating the heaters to less than 5% annual capacity. To ensure compliance with the 5% annual capacity, the heaters are limited to a total combined annual natural gas usage of 257 MMcf/yr. These requirements are part of the SIP-approved 1-hour RACT.

The five boilers/heaters (H-2 Boiloff Heater, H-3 Regen Gas Heater, Uniflux/Exotherm (26), GasMaster Boiler (19A-1), and Gas Master Boiler (19B-1)) are less the 20 MMBTU/hr and comply with 25 PA Code 129.93(c)(1) presumptive RACT requirements for installation, maintenance, and operation in accordance with manufacturers specifications.

The four single cycle combustion turbines (two Solar Gas Turbine compressor and two Solar gas turbine electric generators), which are less than 25 MMBTU/hr and are used for natural gas distribution, will comply with the presumptive RACT 25 PA Code 129.93(c)(2) by installing, maintaining, and operating in accordance with manufacturers specifications.

Each emergency generator complies with presumptive RACT 25 PA Code 129.93(c)(5) by operating less than 500 hours in consecutive 12-month period.

Each of the 294 HP engines for fire pumps complies with presumptive RACT 25 PA Code 129.93(c)(5) by operating less than 500 hours in consecutive 12-month period.

The following removed sources were also subject to presumptive RACT requirements: two (2) Clark stand-by engines and, two (2) Ingersoll-Rand standby boil-off compressors. AMS is requesting to remove the applicable requirements for these units form the 1-hour RACT.

Summary Table - Applicable Presumptive RACT

Sources	Presumptive RA CT
Six (6) Vaporizer Heater between 94.1 and 105.0 MMBTU/hr	25 PA Code 129.93(c)(5)
Two (2) Heater 11 MMBTU/hr or less	25 PA Code 129.93(c)(1)
Four (4) turbines 13.7 MMBTU/hr or less three	25 PA Code 129.93(c)(2)
Three (3) boilers/heater less than 10 MMBTU/hr	25 PA Code 129.93(c)(1)
Three (3) 295 HP engines for fire pumps	25 PA Code 129.93(c)(5)
Two (2) 170 HP emergency generators	25 PA Code 129.93(c)(5)

Conclusions and Recommendations:

The case-by-case requirements under the previous 1-hour RACT determination are no longer applicable, since sources subject to these requirements have been shutdown. All existing sources at the facility are covered by presumptive RACT. AMS proposes these requirements continue to represent RACT under the 1997 8-hour ozone standard..

Changes to the SIP-approved 1-hour RACT

AMS is requesting changes to the 1-hour RACT to remove any requirements for shutdown sources.

(Strikethrough is used to show requirements to be removed)

1. The purpose of this Plan Approval is to establish Nitrogen Oxides (NOx) Reasonably Available Control Technology (RACT) for PGW This includes the following emission sources and control equipment:

   A. Emission Sources:

Unit Description	Fuel Type	Full Rated Capacity
~~Four Clark HLA -8T (C2A, C2B, C3A, C3B)~~	~~Natural Gas~~	~~2,350 horsepower~~
LNG vaporization Heater	Natural Gas	94.1 MMBTU/hr
LNG vaporization Heater	Natural Gas	94.1 MMBTU/hr
LNG vaporization Heater	Natural Gas	96.6 MMBTU/hr
LNG vaporization Heater	Natural Gas	102.1 MMBTU/hr
LNG vaporization Heater	Natural Gas	105.0 MMBTU/hr
LNG vaporization Heater	Natural Gas	105.0 MMBTU/hr
~~Two Standby Clark HLA -8T (C1A, C1B)~~	~~Natural Gas~~	~~2,350 horsepower~~
~~Two Standby Ingersoll-Rand boiloff compressors KVG-83FL/HL~~	~~Natural Gas~~	~~800 horsepower~~

   B. Control Equipment

      (1) ~~Four Clark HLA -8T 2,350 horsepower Units (C2A, C2B, C3A, and C3B) shall be retrofitted with new high energy ignition systems, AFR controls, a turbocharger system enhancement along with new fuel valves~~.

      (2) Limit the following units' operating schedule to five percent of their maximum operating capacity:

      LNG vaporization Heater 94.1 MMBTU/hr
      LNG vaporization Heater 94.1 MMBTU/hr
      LNG vaporization Heater 96.6 MMBTU/hr
      LNG vaporization Heater 102.1 MMBTU/hr
      LNG vaporization Heater 105.0 MMBTU/hr
      LNG vaporization Heater 105.0 MMBTU/hr
      ~~Two Standby Clark HLA -8T 2,350 horsepower (C1A, C1B) Units~~
      ~~Two Standby Ingersoll-Rand boiloff compressors KVG-83FL/HL 800 horsepower Units~~

2. This approval requires and authorizes:

   ~~A. Four Clark HLA -8T 2,350 horsepower units, respectively C2A, C2B, C3A and C3B shall be retrofitted with new high-energy ignition systems, AFR controls, a turbocharger system enhancement along with new fuel valves.~~

   ~~B. Based on a rolling 12-month period, the annual fuel consumption for the four Clark HLA -8T 2,350 horsepower units shall be limited to 570 MMCF of natural gas.~~

   C. PGW shall comply with the requirements as specified in the RACT requirements of 25 PA Code 129.91(f); pertaining to expeditious compliance.

   D. The following sources shall comply with presumptive RACT requirement requirements of 25 PA Code 129.93(c)(5):

      (1) Calculated on a 12-month rolling period the total annual fuel usage for the Six LNG vaporization Heaters 103 MMBTU/hr Units is limited to 257 MMCF of natural gas.

~~(2) Calculated on a 12-month rolling period, the annual fuel usage for the Two Standby Clark HLA -8T-2,350 horsepower (C1A, C1B) Units shall be limited to 14.8 MMCF of natural gas.~~

(3) ~~Calculated on a 12-month rolling period, the annual fuel usage for Two Standby Ingersoll-Rand boiloff compressors KVG-83FL/HL-800 horsepower Units is limited to 6.7 MMCF of natural gas.~~

3. Emission Limitations:

~~A. The maximum air contaminant emissions from the equipment listed in the "Sources" section of this RACT Permit shall have the following limitations:~~

~~(1) Nitrogen Oxides (NOx):~~

~~a) Each of the four Clark HLA -8T 2,350 horsepower units (C2A,C2B, C3A, C3B) shall have individual stack emission limitations of 5grams per Brake Horse Power per Hour for Oxides of Nitrogen (NOx). Compliance with these limitations shall be demonstrated by using appropriate emission calculation procedures which are approved by AMS. (See 5.Testing Requirements).~~

~~b) Each of the four Clark HLA -8T 2,350 horsepower units (C2A,C2B, C3A, C3B) shall have individual stack emission limitations of 25.9 lbs. of Oxides of Nitrogen (NOx) per hour. Compliance with these limitations shall be demonstrated by using appropriate emission calculation procedures, which are approved by AMS. (See 5.Testing Requirements).~~

~~c) The four Clark HLA -8T 2,350 horsepower units (C2A, C2B, C3A, and C3B) shall have a total emission limitation of 320 tons of Oxides of Nitrogen (NOx) per year, calculated on a 12-month rolling period. Compliance with these limitations shall be demonstrated by using appropriate emission calculation procedures that are approved by AMS. (See 5.Testing requirements)~~

4. RACT Implementation Schedule:

A. Upon issuance of this approval, PGW shall begin immediate implementation of the measures necessary to comply with this RACT permit.

~~B. PGW shall operate NOx controls on the Four Clark HLA_8T Units (C2A, C2B, C3A, and C3B) by May 31, 1997.~~

5. Testing Requirements:

~~A. PGW must conduct performance testing on the Four Clark HLA_8T Units (C2A,C2B, C3A, and C3B) once every five years to demonstrate compliance with this RACT permit. Compliance testing shall be performed between the calendar period of July 1 and September 1 of each scheduled test year.~~

~~B. PGW shall submit to AMS a proposed stack testing protocol at least (60) days prior to the scheduled date for that stack testing.~~

C. If at any time AMS has cause to believe that air contaminant emissions from any source(s) listed in Section A of this permit may be in excess of the limitations specified in this permit, or established pursuant to, any applicable rule or regulation contained in 25 PA Code Article III, the Permittee shall be required to conduct whatever tests are deemed necessary by AMS to determine the actual emission rate(s).

6. Monitoring Requirements:

~~A. Engine mapping conducted in conjunction with the initial compliance testing of the Clark HLA-8T 2350 horsepower units shall be used to establish coefficients for the control algorithms of each engine, including air/fuel ratio, ignition timing and air manifold temperature control.~~

No changes are proposed in Conditions 7 through 9.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Noelle Helmstetter

Date: May 6, 2014

Subject: 8-Hour RACT Analysis for Plains Product Terminal LLC

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Plains Products Terminal LLC owns and operates two adjacent bulk liquid storage and distribution terminal. The current facility was originally two separate facilities with different owners. Most recently the North Terminal was owned by ST Services and the South Terminal was owned by Exxon Mobil. When PPT bought both the North and South Terminals, both terminals became one facility under common ownership

Plains Products Terminal LLC used to be named "Maritank Philadelphia, Inc."

Applicability for NOx and VOC RACT:

Plains Products Terminal LLC is not a major source of NOx having potential NOx emissions less than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone NAAQS.

Plains Products Terminal LLC is a major source of VOC having potential VOC emissions greater than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

Plains Products Terminal LLC is subject to the 1-hour RACT for VOC, as per the 1-hour RACT Plan Approval listed under the facility's previous name, "Maritank Philadelphia, Inc.", effective on December 28, 1995, as approved by EPA on October 31, 2001 in 66 FR 54947.

Process Descriptions:

The facility's air emissions sources contributing to VOC emissions include the following:

- One (1) 20 MMBTU/hr thermal fluid heater;
- One (1) 4.74 MMBtu/Hr boiler;
- Six (6) 0.25 MMBTU/hr space heating units (listed as "insignificant sources" on Title V Operating Permit V10-025);
- 13 petroleum/organic products storage tanks each with a capacity greater than or equal to 10,566 gallons;
- 7 petroleum/organic products storage tanks each with a capacity less than or equal to 40,000 gallons;
- 23 storage tanks each with a capacity each less than 4,725,000 gallons (listed as "insignificant sources" on Title V Operating Permit V10-025);
- Truck loading process including loading trucks at Rack and at Recovery Tanks;
- Non-gasoline marine loading of petroleum/organic products with a Reid Vapor Pressure (RVP) of less than 4.0;
- Fugitive emissions from light liquids and gasoline from pumps, valves, & flanges;
- Removal of tank water bottoms (listed as "insignificant sources" on Title V Operating Permit V10-025);
- Tank cleaning and repair (listed as "insignificant sources" on Title V Operating Permit V10-025);

- Parts cleaner (listed as “insignificant sources” on Title V Operating Permit V10-025);
- Additional fugitive emissions source (listed as “insignificant sources” on Title V Operating Permit V10-025);
- Lubricity additive system at the North Terminal (listed as “insignificant sources” on Title V Operating Permit V10-025);
- Lubricity additive system at the South Terminal (listed as “insignificant sources” on Title V Operating Permit V10-025);
- Miscellaneous activities and equipment (listed as “insignificant sources” on Title V Operating Permit V10-025).

The facility’s control devices include the following:

- One (1) Vapor Incinerator;
- One (1) Carbon Absorption Vapor Recovery Unit equipped with two (2) carbon beds;
- Oil mist/asphalt loading.

Presumptive RACT:

The following sources are covered by Presumptive RACT regulations, as is specified in the “Presumptive RACT Regulation” column of the table below:

Boilers

Unit	Heat Input (BTU/hr.)	Fuel Burned	CTG RACT Regulation
CU-2 Thermal Fluid Heater B	20,000,000	No. 6 oil, No. 4 oil, No. 2 oil & Natural Gas	25 PA Code 129.93(b)(2)
CU-3 Boiler (IP No. 12145)	4,740,000	No. 2 & Natural Gas	25 PA Code 129.93(c)(1)

Both boilers replaced two boilers included in the 1-hour RACT Plan Approval. Both replacement boilers are applicable to Presumptive RACT regulations.

For the one (1) 20 MMBtu/Hr boiler, the presumptive RACT requirement is the performance of annual adjustments or tune-ups of the boiler, and keeping corresponding records. For the one (1) 4.74 MMBtu/Hr boiler, the presumptive RACT requirement is the installation, operation, and maintenance of the boiler as per the manufacturer’s specifications.

Space Heating Units

Unit	Heat Input (BTU/hr.)	CTG RACT Regulation
6 Space Heating Units	Each < 250,000	25 PA Code 129.93(c)(1)

For the six (6) < 250,000 Btu/Hr boiler, the presumptive RACT requirement is the installation, operation, and maintenance of the boiler as per the manufacturer’s specifications.

CTG RACT [i.e. Applicable to EPA Control Technique Guideline (CTG)]:

The following sources are covered by CTG RACT regulations, as is specified in the “CTG RACT Regulation” column of the table below:

Storage Tanks (≥ 10,566 gallons)

Unit	Description	Capacity (Gallons)	CTG RACT Regulation
T-7	Tank #15006 *(≥ 10,566 gallons)*	4,725,000	25 PA Code 129.56
T-8	Tank #4007 *(≥ 10,566 gallons)*	1,260,000	25 PA Code 129.56
T-12	Tank #4511 *(≥ 10,566 gallons)*	1,417,500	25 PA Code 129.56
P60(S)	Storage Tank #5460 *(≥ 10,566 gallons)*	2,279,802	25 PA Code 129.56
P65(S)	Storage Tank #1965 *(≥ 10,566 gallons)*	817,572	25 PA Code 129.56
P68(S)	Storage Tank #6768 *(≥ 10,566 gallons)*	2,752,218	25 PA Code 129.56
P69(S)	Storage Tank #4069 *(≥ 10,566 gallons)*	1,664,082	25 PA Code 129.56
P70(S)	Storage Tank #6070 *(≥ 10,566 gallons)*	2,482,788	25 PA Code 129.56
P71(S)	Storage Tank #9771 *(≥ 10,566 gallons)*	3,975,132	25 PA Code 129.56
P72(S)	Storage Tank #6072 *(≥ 10,566 gallons)*	2,588,334	25 PA Code 129.56
P73(S)	Storage Tank #6073 *(≥ 10,566 gallons)*	2,516,724	25 PA Code 129.56
P7(S)	Storage Tank #6073 *(≥ 10,566 gallons)*	2,253,132	25 PA Code 129.56
P8(S)	Storage Tank #5407 *(≥ 10,566 gallons)*	2,256,224	25 PA Code 129.56

For storage tanks with capacities greater than 40,000 gallons, since each unit stores petroleum/organic products with a vapor pressure ≤ 11 psi, the RACT requirement is the installation of an external or an internal floating roof.

Storage Tanks (≤ 40,000 gallons)

Unit	Description	Capacity (Gallons)	CTG RACT Regulation
T-18	Recovery Tank #1 *(≤ 40,000 gallons)*	8,814	25 PA Code 129.57
T-19	Recovery Tank #2 *(≤ 40,000 gallons)*	8,814	25 PA Code 129.57
T-20	Recovery Tank #3 *(≤ 40,000 gallons)*	8,814	25 PA Code 129.57
T-21	Recovery Tank #4 *(≤ 40,000 gallons)*	8,814	25 PA Code 129.57
T-22	Recovery Tank #5 *(≤ 40,000 gallons)*	8,814	25 PA Code 129.57
T-23	Recovery Overflow Tank #1 *(≤ 40,000 gallons)*	8,814	25 PA Code 129.57
T-24	Recovery Overflow Tank #2 *(≤ 40,000 gallons)*	8,814	25 PA Code 129.57

For storage tanks with capacities greater than 2,000 gallons, since each unit stores petroleum/organic products with a vapor pressure > 1.5 psi, the RACT requirement is the existence of pressure relief valves which are maintained in good operating condition and which are set to release at various pressures.

Truck Loading

Unit	Description	CTG RACT Regulation
P-2	Loading Trucks at Rack	25 PA Code 129.59
P-3	Loading Trucks at Recovery Tanks	25 PA Code 129.59

For the loading trucks at the rack and recovery tanks process, the facility is utilizing a vapor collection system connected to its five (5) recovery tanks designed to collect the total organic compounds vapors displaced from tank trucks during product loading. This is consistent with the 1-hour RACT Plan Approval. Additionally, a Carbon Absorption Vapor recovery Unit with two (2) carbon beds and a Vapor Incinerator have been implemented at the South and North terminals, etc.

Marine Loading

Unit	Description	CTG RACT Regulation
P-1	Marine Loading	AMR V, Section V

For the marine loading process, the facility shall not load gasoline or any other organic material having a Reid vapor pressure of 4.0 pounds or greater at the dock transfer station.

Other:

Fugitive Emissions

Unit	Description	Comments
Fugitive Emissions	From pumps, valves & flanges: Light liquids, Gasoline	LDAR Program

For the fugitive emissions from pumps, valves, and flanges, the facility is implementing a quarterly visible leak detection and repair (LDAR) program for all pumps, valves, and flanges in VOC service. This is consistent with the 1995 1-hour RACT Plan Approval.

23 storage tanks each with a capacity each less than 4,725,000 gallons, Removal of Tank Water Bottoms; Tank Cleaning and Repair; Parts Cleaner; Additional Fugitive Emissions; Lubricity Additive System North Terminal Rack; Lubricity Additive System South Terminal Rack; & Miscellaneous Activities and Equipment

The above "insignificant sources" on the Title V Operating Permit V10-025 have minimal VOC emissions.

Conclusions and Recommendations:

Air Management Services proposes that the quarterly LDAR program continues to be RACT for fugitive emissions from pumps, valves and flanges. AMS proposes the 1-hour RACT as 1997 8-hour RACT. All other significant VOC emitting sources are either covered by presumptive RACT or are applicable to CTG regulations.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Biji Pandisseril

Date: February 24, 2014

Subject: 8-Hour RACT Analysis for The Navy Foundry and Propeller Center (PLID # 09702)

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of VOC and NOx. Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

The Navy Foundry and Propeller Center is located at Navy Yard, Philadelphia, PA 19112. The 1-hour ozone RACT in the RACT Plan Approval dated April 20, 1999 was issued to Philadelphia Naval Shipyard. The Naval Foundry and Propeller Center is Navy facility with cement mixing, metal melting, metal stress relieving, and metal grit blasting facility as per foundry operations and a machining, degreasing, painting and blasting of metal parts facility as per the machine shop.

Applicability for NOx and VOC RACT:

The Navy Foundry and Propeller Center is a major source of Nitrogen Oxides (NOx) having potential NOx emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone NAAQS. The facility is a major source of Volatile Organic Compounds (VOC) having potential VOC emissions is greater than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

Process Descriptions:

The Navy Foundry and Propeller Center currently has the following

NOx Souces

Building 20

Reverbatory Furnace	18 MMBTU/hr	Natural Gas	
2 Sand Core Ovens	15 MMBTU/hr total	Natural Gas	
2 Crucible Furnaces	<20 MMBTU/hr each	Natural Gas	
Stress Relieving Oven	20 MMBTU/hr	Natural Gas	
2 Heat Treating Ovens	8.8 MMBTU/hr each	Natural Gas	
6 Ladle Preheaters	<20 MMBTU/hr each	Natural Gas	
2 Small Ovens	<20 MMBTU/hr each	Natural Gas	
5- air rotating units	1.875 MMBTU/hr	Natural Gas	Powrmatic (Model # TE41)
7- make-up air units	3.0 MMBTU/hr	Natural Gas	Powrmatic (Model # GA-227)
1- air handling unit	0.4 MMBTU/hr	Natural Gas	Johnson York (Model # J20ZJN32P4AAA1)
1- Make-up air unit	1.25 MMBTU/hr	Natural Gas	Powermatic (Model # MA-100)
1-Rooftop heater	0.250 MMBTU/hr	Natural Gas	Reznor (Model # RDH-250)
Emergency Generator	20 KW	Natural Gas	

Building 546

3- Air rotating units	2.2 MMBTU/hr	Natural gas Powrmatic (Model # TE41)
2-Heater	0.125 MMBTU/hr	Natural Gas Modine (Model # HDS-125)
Building 592		
1- Air rotation unit	2.2 MMBTU/hr	Natural gas Powrmatic (Model # TE41)
Building 712		
2- boilers	0.52 MMBTU/hr	Natural gas Weil McLain (Model # LGB-05-S)
Building 1029		
2- Air rotating units	2.2 MMBTU/hr	Natural gas Powrmatic (Model # TE51)

VOC Sources

Building #20	
Film Developing (X-ray, NDT room)	Hydroquinone
Building #1029	
Propeller Cleaning	Simple Green Industrial/ Keynote Cleaner
Paint Spray Bay (coat propeller parts)	

The following sources that were part of the original 1-hour RACT analysis for the facility has been removed and no long operational at the facility:

Building 23 - Five Boilers (#187, 188, 189, 190, & 191)
Building 4 - 2 Natural Gas generators
6 Diesel Generators
8 Platisol Storage and Dip Tanks
Plasma Cutting System
Building 6, 57, & 87 natural gas Space Heaters

Presumptive RACT:

The Building 20 Stress Relieving Oven accepted a 5% annual capacity factor in accordance with presumptive RACT limitations of 25 PA Code Section 129.93(c)(5). All other combustion units are less the 20 MMBTU/hr is to be comply with 25 PA Code 129.93(c)(1) presumptive RACT requirements for installation, maintenance, and operation in accordance with manufacturers specification. The emergency generator will comply with 25 PA Code 129.93(c)(5) presumptive RACT requirements to operate less than 500 hours in a consecutive 12-month period.

The Propeller Cleaning (P11) in Building # 1029 fulfills the VOC RACT requirement in accordance with 25 Pa Code 129.91(a) by being subject to 25 Pa Code 129.63 for Degreasing operations. The Paint Spray Bay in Building # 1029 fulfills the VOC RACT requirement in accordance with 25 Pa Code 129.91(a) by being subject to 25 Pa Code 129.52 for Surface coating process. The Film Development in Building #20 is only used twice a year and solvent is reduced to 1:10 part of water. The emissions from this process is less than 0.5 tpy.

Summary Table - Applicable Presumptive RACT

Building 20	Presumptive RACT
Reverbatory Furnace	25 PA Code 129.93(c)(1)
2 Sand Core Ovens	25 PA Code 129.93(c)(1)
2 Crucible Furnaces	25 PA Code 129.93(c)(1)
Stress Relieving Oven	25 PA Code 129.93(c)(5)
2 Heat Treating Ovens	25 PA Code 129.93(c)(1)
6 Ladle Preheaters	25 PA Code 129.93(c)(1)
2 Small Ovens	25 PA Code 129.93(c)(1)
5- air rotating units	25 PA Code 129.93(c)(1)
7- make-up air units	25 PA Code 129.93(c)(1)
1- air handling unit	25 PA Code 129.93(c)(1)
1- Make-up air unit	25 PA Code 129.93(c)(1)
1-Rooftop heater	25 PA Code 129.93(c)(1)
Emergency Generator	25 PA Code 129.93(c)(5)

Building 546		
3- Air rotating units		25 PA Code 129.93(c)(1)
2-Heater	25	PA Code 129.93(c)(1)
Building 592		
1- Air rotation unit		25 PA Code 129.93(c)(1)
Building 712		
2- boilers		25 PA Code 129.93(c)(1)
Building 1029		
2- Air rotating units		25 PA Code 129.93(c)(1)
Building #1029		
Propeller Cleaning	25	Pa Code 129.63
Paint Spray Bay (coat propeller parts)		25 Pa Code 129.52
Building #20		
Film Developing (X-ray, NDT room)		de-minimis (less than 0.5 tpy)

No further analysis is needed for 8-hour RACT.

Conclusions and Recommendations:

All sources are covered by presumptive RACT

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Kassahun Sellassie

Date: Sep 04, 2014

Subject: 1997 8-Hour RACT Analysis for Grays Ferry Cogeneration Partnership

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Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Grays Ferry Cogeneration Partnership owns and operates an electric generating unit facility at 2600 Christian Street, Philadelphia, PA 19146. Equipment used at the facility includes one (1) front wall fired boiler, and one (1) combined cycle combustion turbine (CT).

Applicability for NOx and VOC RACT:

Grays Ferry Cogeneration Partnership has been determined a single source with Veolia Schuylkill and Veolia Energy efficiency. Veolia – Schuylkill Station, GFCP, and Veolia Energy Efficiency are a major source of NOx due to having potential NOx emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone NAAQS. They are not a major source of VOC, due to having potential VOC emissions not greater than 50 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone.

In addition to the above, the station also includes Veolia Schuylkill's three boilers, Boiler #23, #24, and 26, are subject to 1-hour RACT, per the 1-hour RACT determination, issued by AMS as RACT plan approval with PA Permit Number 51-04942 on December 1, 1999, and approved into the SIP by EPA on December 15, 2000 (65 FR 78418). Sources under Veolia Energy Efficiency (PA) LLC that include the two new 297.92 MMBTU/hr boilers.

The facility is not subject to 1-hour ozone RACT.

Process Descriptions:

Grays Ferry Cogeneration Partnership currently has one (1) front wall fired boilers (Boiler # 25) rated 1119 MMBTU/hr and one (1) combined cycle combustion turbine (CT) rated 1515 MMBTU/hr (135 MW). The CT can run with a Heat Recovery Steam Generator (HRSG) The boiler and the CT both burn Natural Gas (NG) and/or #2 oil.

Boiler #25 is equipped with low NOx burner and flue gas recirculation (LNB + FGR). Per Pllan Approval 97019, Boiler #25 has NOx emission limits of 0.10 pounds per MMBTU when firing gas and 0.15 pounds per MMBTU when firing oil. The potential to emit (PTE) for boiler #25 is 490 tons per year when burning gas (1119 MMBTU/hr * 0.1 lb/MMBTU *8760 hr/yr * 1 ton/2000 lb= 490 tpy) and 735 tons per year when burning #2 oil (1119 MMBTU/hr * 0.15 lb/MMBTU *8760 hr/yr * 1 ton/2000 lb= 735 tpy).

The CT is equipped with Selective Catalytic Reduction (SCR) and Dry Low NOx (DLN) when firing gas; SCR and water injection (WI) when firing oil. Per Plan Approval # 97019, dated on 3/8/2001, the CT has NOx emission limits of 0.0344 pounds per MMBTU (9 ppm) when firing gas and 0.168 pounds per MMBTU (42 ppm) when firing #2 oil; the CT with HRSG has emission limit of 0.09 pounds per MMBTU when firing gas and 0.168 pounds per MMBTU when firing oil; these limits don't apply during startup and shutdown. The PTE for CT is 228.3 tons per year when burning gas (1515 MMBTU/hr * 0.0344 lb/MMBTU *8760 hr/yr * 1 ton/2000 lb= 228.3 tpy) and 1114.8 tons per year when burning #2 oil (1515 MMBTU/hr * 0.168 lb/MMBTU *8760 hr/yr * 1 ton/2000 lb= 1114.8 tpy). Boiler #25 and the CT have a combined NOx limit of 540 tons per year in Plan Approval # 97019, dated on 3/8/2001.

The following were considered possible additional NOx controls as RACT for Boiler #25: (1) Selective Catalytic Reduction (SCR), (2) Ultra Low-NOx Burners (ULNB) and Overfire Air (ULNB with OFA), (3) Selective Non-Catalytic Reduction (SNCR), and (4) Ultra Low NOx Burners (ULNB),

ULNB are burners designed to create a larger, lower temperature flame. They would reduce NOx emissions by around 25% for Boiler #25

ULNB with OFA reduce NOx emissions by around 35% for Boiler #25

SCR injects ammonia upstream of a catalyst. NOx, ammonia (NH_3), and oxygen (O_2) react on the surface of the catalyst to form nitrogen (N_2) and water (H_2O). NOx emissions are reduced by around 80%.

SNCR reduce NOx emissions by around 25% for Boiler #25

The NOx emissions for Boiler No. 25 were determined based on the rated capacity of 1119 MMBTU/hr, 8,760 hours per year, and a 0.15 lbs/MMBTU NOx emission limit. The NOx emissions are 735 tons per year for Boiler No. 25.

The following NOx controls were determined technologically feasible for Boiler No.25.

Source	Control Technology	Baseline NOx Emissions (tpy)	NOx Reduction (%)	NOx Reduction (tpy)	Total Annualized Cost ($/year)	Cost Effectiveness ($/Ton)
Schuylkill Boiler #25	SCR	735	80	588	3,245,568	5,520
	ULNB + OFA	735	35	257	1,044,289	4,063
	SNCR	735	25	183	806,477	4,407
	ULNB	735	25	183	639,677	3,496

These controls were determined economically unreasonable, because their respective cost-effectiveness is above $2,500/ton, which AMS has determined as the threshold for economic feasibility for NOx RACT. Thus, the existing control for boiler #25 (LNB + FGR) represents NOx RACT for the 1997 8-hour ozone standard

For Combustion Turbine (CT), the emission limits established by operation of existing control equipment (SCR + WI) are currently the lowest reasonable achievable emissions rates of NOX for this unit and no available control options would be more stringent. SCR + WI have efficiency of 90-98% emission reduction, FGR has 40% NOx emission reduction, LNB has 20-30%, SNCR has 40% reductions [Vendors Report. (References are: vendors report[1,2], NESCAUM[3], OAQPS[4], Clean AIR Council[5], EPA-452/F-03-032[6], ACT[7]]. Thus, the existing control for the combustion turbine (SCR + WI) represents NOx RACT for the 1997 8-hour ozone standard

Source	Control Technology	Pre-Control Emissions (tpy)	NOx Reduction (%)	NOx Reduction (tpy)
Combustion Turbine (1515 MMBTU/hr or 135 MW)	SCR + WI	1238.7	90 (98)	1114.8 (1213.9)
	FGR	1238.7	40	495.5
	SNCR	1238.7	40	495.5
	LNB	1238.7	30	371.6

Conclusions and Recommendations:
AMS has determined that the existing control for CT (SCR + WI) and the existing control for boiler #25 (LNB + FGR) represent NOx RACT for the 1997 8-hour ozone standard for Grays Ferry Cogeneration, LLC.

AMS requests these requirements to be approved as RACT in the SIP.
Thus, AMS determines the following as RACT:

- Boiler #25- NOx emissions shall not exceed 0.10 pounds per MMBTU when firing gas and 0.15 pounds per MMBTU when firing oil. The emission for boiler #25 is 490 tons per year when burning gas and 735 tons per year when burning #2 oil.

- The Combustion Turbine has a NOx emission should not exceed 0.0344 pounds per MMBTU (9 ppm) when firing gas and 0.168 pounds per MMBTU (42 ppm) when firing oil. The CT NOx limits exclude startup and shutdown.

- The facility shall monitor and record compliance based on NOX CEMs for Boiler #25 and CT.

References:

[1]Manufacturers of Emission Controls Association (MECA) states SCR Control 90% NOX and the most effective emission control www.meca.org

[2]Minnesota Power vendor and EPA's Clean Air Markets (CAM) data: SCR is expected to achieve a NO_X emission rate of 0.05 lb/mmBtu guarantees offered by SCR system suppliers

[3]Northeast States for Coordinated Air Use Management (NESCAUM). Status Report on NOx Control Technologies and Cost Effectiveness for Utility Boilers. June 1998 and 2008

[4]*EPA Air Pollution Control Cost Manual* (EPA 452/B-02-001) http://epa.gov/ttn/catc/products.html#cccinfo

[5]http://www.4cleanair.org/Documents/ATTACHMENTNOXFINALASFILED.pdf

[6] EPA Air Pollution Control Technology Fact Sheet, SCR Achievable emission limits

[7]ACT document, NOx Emission from ICI Boilers, March 1994, USEP

GRAYS FERRY COGENERATION PARTNERSHIP BOILER #25

Table 1 Detail Calculations for BOILER # 25- SCR

Total Capital Cost			
Total Capital Investment Cost (TCI)	$9,956,557		Based EPA Cost Control Manual of $6000/MMBTU/Hr. Escalate 1997 $ using the Marshall and swift Index[1]
Capital Recovery	**$2,374,639**	**0.2385**	**10 yrs @20% -[1] CRF=0.2385; CR = CRF x TCI**
Annual Operating Costs			
Direct Annual Cost			
Electricity Cost[2]	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr
Operator[1]	$16,425		0.5hr/shift, 3 shift/day, $30/hr
Supervisor[1]	$2,463.75		15% of Operator
Maintenance[1]	$19,162.50		0.5hr/shift, 3 shift/day, $35/hr
Material[1]	$19,162.50		100% of Maintenance
Ammonia[1]	$233,874		17/46 * 4moles of NH_3/2 moles of NO *1.05 * NOx emission (tpy) *$410/ton
Catalyst Cost[1]	190,000	0.1638	SFF=0.1638, for 5 yrs and 10%; Annual Catalyst Replacement Cost= $31,122
Total Direct Annual Cost	**551,168**		
Indirect Annual Cost			
Overhead	$11,498		60% of maintenance
Administrative Charge[1]	$199,131		2% of TCI
Property Taxes[1]	$99,566		1% of TCI
Insurance[1]	$99,566		1% of TCI
Total Indirect Annual Cost	**$319,761**		
Total Annual Operating Costs	**$3,245,568**		
NOx Baseline Emissions (TPY)	735		Based on the rated capacity of 1119 MMBTU/hr, 8,760 hours per year, and a 0.15 lbs/MMBTU NOx emission limit.
NOx Emission Reduction (TPY)	588		Based on 80 % of NOx removed.
Cost Effectiveness ($/ton NOx removed)	**$5,520**		

Table 2 Detail Calculations for Boiler # 25- ULNB + OFA

Total capital Cost			
Total Capital Investment Cost (TCI)	**$3,251,339**		TCI includes equipment cost estimates from NESCAUM 2002 Status Report on NOx Control for Boilers[3]
Capital Recovery	**$775,444**	**0.2385**	**10 yrs @20% CRF=0.2385; CR = TCI * CRF**
Annual Operating Costs			
Direct Annual Cost			
Electricity Cost	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr
Operator	$16,425		0.5hr/shift, 3 shift/day, $30/hr
Supervisor	$2,463.75		15% of Operator
Maintenance	$19,162.50		0.5hr/shift, 3 shift/day, $35/hr
Material	$19,162.50		100% of Maintenance
Total Direct Annual Cost	**$127,294**		
Indirect Annual Cost			
Overhead[1]	$11,498		60% of maintenance
Administrative Charge[1]	$65,027		2% of TCI
Property Taxes[1]	$32,513		1% of TCI
Insurance[1]	$32,513		1% of TCI
Total Indirect Annual Cost	**$141,551**		
Total Annual Operating Costs	**$1,044,289**		
NOx Baseline Emissions (TPY)	735		Based on the rated capacity of 1119 MMBTU/hr, 8,760 hours per year, and a 0.15 lbs/MMBTU NOx emission limit.
NOx Emission Reduction (TPY)	257		Based on 35 % of NOx removed.
Cost Effectiveness ($/ton NOx removed)	**$4,063**		

Table 3 Detail Calculations for Boiler # 25 ULNB

Total capital Cost			
Total Capital Investment Cost (TCI)	$1,798,514		TCI includes equipment cost estimates from NESCAUM 2002 Status Report on NOx Control for Boilers[3]
Capital Recovery	**$428,946**	**0.2385**	**10 yrs @20% CRF=0.1993; CR = CRF x TCI**
Annual Operating Costs			
Direct Annual Cost			
Electricity Cost	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr
Operator	$16,425		0.5hr/shift, 3 shift/day, $30/hr
Supervisor	$2,463.75		15% of Operator
Maintenance	$19,162.50		0.5hr/shift, 3 shift/day, $35/hr
Material	$19,162.50		100% of Maintenance
Total Direct Annual Cost	**$127,294**		
Indirect Annual Cost			
Overhead[1]	$11,498		60% of maintenance-
Administrative Charge[1]	$35,970		2% of TCI
Property Taxes[1]	$17,985		1% of TCI
Insurance[1]	$17,985		1% of TCI
Total Indirect Annual Cost	**$83,438**		
Total Annual Operating Costs	**$639,677**		
NOx Baseline Emissions (TPY)	735		Based on the rated capacity of 1119 MMBTU/hr, 8,760 hours per year, and a 0.15 lbs/MMBTU NOx emission limit.
NOx Emission Reduction (TPY)	183		Based on 25% of NOx removed.
Cost Effectiveness ($/ton NOx removed)	**$3,496**		

Table 4 Detail Calculations for Boiler # 25 SNCR

Total Capital Cost			
Direct Capital Cost	$2,111,593		Based EPA's Cost Control Manual of (($950/MMBTU)* Qb(MMMBTU/hr)(2375 mmbtu/hr/Qb)*(0.66+0.85 n_{NOx}) Qb= boiler size(mmbtu/hr); n_{nox}= nox removal efficiency; [1]
Indirect Capital Cost	$422,319		Based EPA's Cost Manual
Total Capital Investment Cost (TCI)	$2,533,912		
Capital Recovery	**$604,338**	**0.2385**	**10 yrs @20% CRF=0.2385; CR = TCI x CRF**
Annual Operating Costs			
Direct Annual Cost			
Electricity Cost	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr
Operator	$16,425		0.5hr/shift, 3 shift/day, $30/hr
Supervisor	$2,463.75		15% of Operator
Maintenance	$19,162.50		0.5hr/shift, 3 shift/day, $35/hr
Material	$19,162.50		100% of Maintenance
Total Direct Annual Cost	**$127,294**		
Indirect Annual Cost			
Overhead	$11,498		60% of maintenance[1]
Administrative Charge	$42,232		2% of TCI[1]
Property Taxes	$21,116		1% of TCI[1]
Total Indirect Annual Cost	**$74,845**		
Total Annual Operating Costs	**$806,477**		
NOx Baseline Emissions (TPY)	735		Based on the rated capacity of 1119 MMBTU/hr, 8,760 hours per year, and a 0.15 lbs/MMBTU NOx emission limit.
NOx Emission Reduction (TPY)	183		Based on 25 % of NOx removed.
Cost Effectiveness ($/ton NOx removed)	**$4,407**		

References

1. Office of Air Quality Planning and standards (OAQPS), Environmental Protection Agency (EPA) Air Pollution Control Manual, Sixth Edition, EPA/452/B-02-001, January 2002.
2. Electricity cost: EPA cost manual, Appendix A-NOx Control Analysis
3. North East States for Coordinated Air Use Management (NESCAUM) 2002 Status Report on NOx Control for Boilers

4. Capital Recovery = Convert from P (present) to A(Annual amount), A=P(A/P,i%,n),

   $CR = \frac{i(1+i)^n}{(1+i)^n - 1}$ 20% interest and 10 yrs = A/P=0.2385; Annual Cost = TCI x CFR

5. Catalyst Cost of SCR: The catalyst life is 5 years. The annual cost is given by the sinking fund factor (SFF). The SFF is the amount of money the facility will need to set aside each year to be able to replace the catalyst at the end of its life, based on the lifespan of the catalyst and the interest rate.

6. SFF = Convert from F (Future) to A(Annual amount), A=F(A/F,i%,n),

   $SFF = \frac{i}{(1+i)^n - 1}$ 10% interest and 5 yrs = A/F=0.1638

   Where i= Annual interest Rate (10%); n= catalyst system life (5 years);

   Catalyst Annual Cost = SFF x Catalyst Cost

7. Ammonia Cost:

   $4NH_3 + 2NO_2 + O_2 \longrightarrow 3N_2 + 6H_2O$

   Annual Ammonia Cost = (17/46 * 4moles of NH_3/2 moles of NO2 *1.05 * NOx emission (tpy) *$410/ton yrs)

   NH_3 = Ammonia, NO_2 = Nitrogen Dioxide; O_2 = Oxygen; H_2O = Water; 1.05= Ammonia slip and excess ammonia

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Rahel Gebrekidan

Date: August 27, 2014

Subject: 1997 8-Hour RACT Analysis for Temple University-Main Campus

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone National Ambient Air Quality Standard (NAAQS). This document presents the findings of a RACT evaluation for the 1997 8-hour ozone standard for this facility.

Company Description:

Temple University – Main Campus (Temple MC) is a multi-building educational institution in the City of Philadelphia. In order to provide needed utilities for maintaining heat, power (both backup and supplemental), and providing hot water, Temple MC operates a number of steam boilers, hot water boilers, and internal combustion engines to produce electricity. The facility's air emissions sources include 16 Boilers and hot water heaters <20 MMBTU/hr, 5 Boilers >= 20 MMBTU/Hr and <50 MMBTU/Hr, 3 boilers > 50MMBTU/hr boilers, 10 Standby Electric Generating units each 2250 HP, 59 emergency generators and fire pumps, and 20 catalyst oxidizers. The 63.9 MMBTU/hr Central Steam Plant Rental boiler currently listed in the Title V operating permit has been deactivated and is being removed from the facility.

Applicability for NOx and VOC RACT:

Temple Main is a major source of NOx due to having potential NOx emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT. This facility is not a major source of VOC having potential VOC emissions less than 50 tons per year, the major source threshold in Philadelphia County that is applicable to VOC RACT for the 1997 8-hour ozone NAAQS.

RACT Evaluation:

Case-by-case RACT sources:
The following sections present detailed evaluation of a Case-by-Case RACT for the applicable sources.

Broad Street Main Campus Expansion Project Boilers (BMCEP The three BMCEP Boilers are each Victory Energy Models VS-4-68, with a natural gas heat input rating of 91.3 MMBTU/Hr and a #2 fuel oil heat input rating of 86.8 MMBTU/Hr. Each unit is an "O-type" watertube boiler and are currently equipped with Low NOx burners (LNB) and flue gas recirculation (FGR). These boilers have the following requirements per AMS Pre-Construction Plan Approval No. 07132 dated 11/27/2007;

1. NOx Emissions from each boiler shall not exceed the following: [25 Pa Code §127.1]

   a) Nitrogen Oxides (NO_x) emissions from the three boilers combined shall not exceed 15.5 tons per rolling 12-month period.

   b) Emissions from each boiler shall not exceed the following: [25 Pa Code §127.1]
      i) NOx: 0.036 lbs/MMBTU while burning natural gas and
      ii) 0.110 lbs/MMBTU while burning No.2 fuel oil

2. Each boiler shall be equipped with Low NOx burners (LNB) and flue gas recirculation (FGR).

To comply with the above emission limits, Temple Main is operating the LNB and FGR on each boiler and performed initial stack test to show compliance with the0.036 lbs/MMBTU and 0.110lbs/MMBTU NOx emission limit.

Control Strategies that were considered for NOx RACT are as follows

- Selective Catalytic Reduction (SCR)
- Selective Non-Catalytic Reduction (SNCR)
- Water/Steam Injection

Selective Catalytic Reduction
Selective catalytic reduction (SCR) is a technology whereby an ammonia or ammonia-based fluid (reducing agent) is injected into the exhaust air stream upstream of a catalyst. Once the mixture comes in contact with the catalyst surface, a reduction reaction occurs, breaking down the NOx (NO or NO2) and NH3 into N2 and H2O. Selective catalytic reduction is ***considered technically feasible.***

Selective Non-Catalytic Reduction
Selective non-catalytic reduction (SCR) is a technology whereby an ammonia or ammonia based fluid (reducing agent) is injected into the exhaust air stream. Once the mixture comes in contact with the catalyst surface, a reduction reaction occurs, breaking down the NOx (NO or NO2) and NH3 into N2 and H2O. Reductions in NOx flue gas concentrations are estimated to be between 20% and 50% for boilers, depending on the reducing chemical used and effective control of optimal operating conditions (exhaust gas temperature). SNCR systems require relatively high gas operating temperatures. Steady temperatures in the range of 1,600 to 2,000°F are required to operate an SNCR system effectively. Selective non catalytic reduction ***is considered technically feasible.***

Water/Steam Injection
The majority of NOx emissions from residual oil-fired boilers results from fuel NOx, not thermal NOx, and water/steam injection systems are not effective in reducing fuel NOx. Literature also indicates that the use of water/steam injection for NOx emissions reduction has a considerable drawback. Fuel and thermal efficiency is typically reduced by 10% for boilers (i.e., energy penalty). Water/steam injection has been primarily applied to gas-fired turbines. Due to the reasons listed, water/steam injection ***is not considered technically feasible*** for the boiler.

The following NOx controls were determined technologically feasible for each boiler: SCR and SNCR. A summary of the cost-effectiveness of these controls is provided below.

For purposes of cost calculations in this evaluation the allowable maximum emission limits of 15.5 tons per rolling twelve month period per boiler has been used. This limit is more stringent than the allowable 0.110 lb/MMBTU and reflects the maximum enforceable emission limits currently applicable for these boilers.

Source	Control Technology	NOx Baseline Emissions (tpy)	NOx Reduction (%)	NOx Reduction (tpy)	Total Annualized Cost ($/year)	Cost Effectiveness ($/Ton)
Each	SCR	15.5	85	13.2	210,481	15,976

BMCEP	SNCR	15.5	20	3.1	59,518	19,199

The SCR and SNCR are determined *economically unreasonable* because their respective cost-effectiveness is above $2,500/ton, which AMS has determined as the threshold for economic feasibility.
For more detailed calculations, please see the Appendix.

Conclusion and recommendation
AMS has determined that the following existing emission limits, control technology, and monitoring and recordkeeping shall be considered NOx RACT for each boiler as approved on AMS Pre-Construction Plan Approval No. 07132 dated 11/27/2007.

a) Nitrogen Oxides (NO_x) emissions from the three boilers combined shall not exceed 15.5 tons per rolling 12-month period.
b) Each boiler shall be installed with low NOx burners and flue gas recirculation**.**
c) Emissions from each boiler shall not exceed the following:
    i) NOx: 0.036 lbs/MMBTU while burning natural gas and
    ii) 0.110 lbs/MMBTU while burning No.2 fuel oil

d) Temple Main shall perform stack test on each boilers when requested by AMS.
e) Temple Main shall monitor and record the monthly fuel usage for each boiler, the combined NOx emissions for the boilers per rolling 12-month period calculated monthly, the combined gas and the combined oil usage for the boilers in MMBTU for a rolling 12-month period calculated monthly

Standby Electric Generating Facility (SEGF)
The Standby Electric Generating Facility (SEGF) is a collection of 10 Caterpillar 3516 engines. Each engine pair is rated at 2,250 brake-horsepower (bhp) and burns natural gas. Each engine pair is attached to a generator that can provide up to 1,600 kilowatts. These units were installed in October 1992. These engines have the following requirements per AMS installation permit number 92087, dated October 2, 1992; [25 Pa Code §127.1]

NOx emissions from the standby electric generator are limited to the following

a) NOx emission from each standby electric generator shall be less than or equal to 2.00 g/bhp-hr;
b) Each Standby Electric Generator shall operate at a maximum of 500 hours per rolling 12-month period
c) The Combined NOx hourly emission rate of less than or equal to 99 lb/hr

To show compliance with the 2.00g/bhp-hr emission limits, Temple Main performed initial stack test on the engines.

Control Strategies that were considered for the NOx RACT for each generator are as follows
- Installation of selective catalytic reduction (SCR) – 90% NOx control
- Installation of non-selective catalytic reduction (SNCR) – 20% NOx control

Selective Catalytic Reduction
Selective catalytic reduction is a technology whereby an ammonia or ammonia-based fluid (reducing agent) is injected into the exhaust air stream upstream of a catalyst. Once the mixture comes in contact with the catalyst surface, a reduction reaction occurs, breaking down the NOx (NO or NO2) and NH3 into N2 and H2O. Any ammonia slip is reduced by utilizing an Oxidation Catalyst, which produce NO.
The estimated overall NOx control efficiency of an SCR system is typically 90% or better.

In order to comply with the current 40 CFR Part 63, Subpart ZZZZ (RICE MACT) standard, each engine (20) is equipped with a Johnson-Matthey Modulex B catalyst designed specifically for CO emission

reduction. The system can additionally be equipped with additional injection system and SCR catalyst downstream of the existing CO catalyst in order to implement an SCR system.
Based on available information, the SCR system is *technically feasible*. There are several vendors capable of providing the catalyst and injection systems; however, based on the existing catalyst system, a Johnson-Matthey injection system with a SINOX high temperature catalyst is the unit under consideration. For this system, the reducing agent would be urea.

Selective Non-Catalytic Reduction
Selective Non-Catalytic Reduction technology for NOx control on 4-stroke lean burn natural gas fired engines has not been installed as a retrofit in many sources; and this technology is not widely available. This is likely due to insufficient exhaust temperature to initiate the reduction reaction without the assistance of a catalyst. Without the catalyst, this emission control technology would require additional heat, resulting in higher operating costs, and potentially more air emissions. As a result, this option is *technically infeasible.*

** The baseline emissions are based on the maximum allowable emission limits of 2.00g/bhp-hr, and 2.47 tons per rolling twelve month period per engine.*
The cost-effectiveness of the SCR was evaluated.

Source	Control Technology	NOx Baseline Emissions (per rolling twelve month period)	NOx Reduction (%)	NOx Reduction (tpy)	Total Annualized Cost ($/year)	Cost Effectiveness ($/Ton)
Each Standby Electric Generator	SCR	2.47	80	1.97	80,880	40,931

The SCR is determined *economically unreasonable* because the respective cost-effectiveness are above $2,500/ton, which AMS has determined as the threshold for economic feasibility.

For more detailed calculations, please see the Appendix.

Conclusion and recommendation
AMS has determined that the following existing emission rates and monitoring and recordkeeping shall be considered RACT for these sources as approved by AMS installation permit 92087 dated 10/02/1992.

NOx emissions from the standby electric generators are limited to the following:

a) NOx emission from each standby electric generator shall be less than or equal to 2.00 g/bhp-hr;
b) Each Standby Electric Generator shall operate at a maximum of 500 hours per rolling 12-month period
c) The Combined NOx hourly emission rate shall be less than or equal to 99 lb/hr

Work practice standard

a) Each Standby Electric Generating Facility shall operate at a maximum of 500 hours per rolling 12-month period
b) Each standby electric generator shall only burn natural gas

Testing requirement

a) Temple Main shall conduct quarterly NOx portable analyzer test on each engine using AMS-approved procedure.

Monitoring and record keeping requirement

a) The combined NOx emission per rolling 12-month period calculated monthly to demonstrate compliance with the above NOx emission limits
b) Operating hours for each Standby Electric Generator per rolling twelve month period calculated monthly
c) Combined amount of fuel used for the Standby Electric Generator per month and
d) Portable analyzer test results for each engine

Presumptive RACT Sources

The following sources meet the various presumptive RACT emission limitations and criteria specified in 25 Pa. Code 129.93.

Table 1-1 lists sources that meet the presumptive RACT requirements specified in 25 Pa Code 129.93(c)(5) [operation and maintenance of engines per manufacturer specifications and use limited to 500 hours per year or less;

Table 1-1

Source Description	Capacity	Fuel/Material	Construction Date
Alter Hall Emergency Generator #1	350 kW	No. 2 Oil	2008
Anderson Hall Emergency Generator #1	125 kW	Natural Gas	1974
Anderson Hall Emergency Generator #2	175 kW	No. 2 Oil	1998
Annenberg (Tele) Emergency Generator	100 kW	No. 2 Oil	1985
Barrack Building Emergency Generator	100 kW	Natural Gas	2002
Bell Building Emergency Generator #1	1040 kW	No. 2 Oil	1986
Bell Building Emergency Generator #2	125 kW	No. 2 Oil	1986
Bio Life Emergency Generator	1,100 kW	No. 2 Oil	1985
CEA Building Emergency Generator #1	170 kW	Natural Gas	1976
CEA Building Emergency Generator #2	125 kW	No. 2 Oil	1998
Central Heat Plant Emergency Generator	<50 kW	Natural Gas	
Wachman Hall Emergency Generator	140 kW	Natural Gas	1977
Conwell (Bldg) Emergency Generator	150 kW	No. 2 Oil	
Conwell(Tele)	250 kW	No. 2 Oil	1985

Emergency Generator			
Conwell/Carnell Hall Emergency Generator	130 kW	No. 2 Oil	1998
ECEC Building Emergency Generator	125 kW	No. 2 Oil	2004

Gladfelter (Tele) Emergency Generator	100 kW	No. 2 Oil	1985
Gladfelter (Bldg) Emergency Generator	150 kW	Natural Gas	1973
Gladfelter Hall Emergency Generator	175 kW	No. 2 Oil	
Johnson/Hardwick Hall Emergency Generator #2	100kW	2 oil	2005
Klein Hall Emergency Generator #1	100 kW	Natural Gas	1973
Klein Hall Emergency Generator #2	103 kW	No. 2 Oil	1998
Liacouras Center Emergency Generator	1000 kW	No. 2 Oil	1997
Liacouras Garage Emergency Generator	125 kW	No. 2 Oil	1997
Paley Emergency Generator #2	100 kW	No. 2 Oil	1998
Peabody Emergency Generator	125 kW	No. 2 Oil	1998
Pearson (Bldg) Emergency Generator	100 kW	Natural Gas	
Ritter Annex (Bldg) Emergency Generator	100 kW	Natural Gas	1973
Ritter Annex (Tele) Emergency Generator	100 kW	No. 2 Oil	1985
SAC Emergency Generator	150 kW	Natural Gas	2002
Student Pavillion Center Emergency Generator	30 kW	natural gas	1999
Temple Towers Fire Pump	110 HP	Diesel	2009
1300 C.B. Moore Generator	150 KW	No. 2 Oil	2001
1800 Liacouras Walk Emergency Generator	80 kW	No. 2 Oil	2005
1940 Liacouras Walk Emergency Generator	80 kW	No. 2 Oil	1999

Table 1-2 lists sources that meet the presumptive RACT requirements specified in 25 Pa Code 129.93(c), operation and maintenance of boilers per manufacturer specifications and maximum heat input ratings <20 MMBTU/Hr; and annual combustion adjustment for maximum heat input ratings >=20 MMBTU/Hr but less than 50 MMBTU/Hr.

Table 1-2

Source Description	Capacity	Fuel/Material	Construction Date
Central Steam Plant Boiler #1	41.24 MMBtu/hr	No. 6 oil Natural gas	1962
Central Steam Plant Boiler #2	41.24 MMBtu/hr	No. 6 oil Natural gas	1962
Central Steam Plant Boiler #3	41.24 MMBtu/hr	No. 6 oil Natural gas	1962
Central Steam Plant Boiler #4	43.84 MMBtu/hr	No. 6 oil Natural gas	1969
Liacouras Center Boiler #4	20.92 MMBtu/hr	Natural Gas	October 1999
White Hall Residence Boiler #1	1.9 MMBTU/hr	Natural gas	After 1970
White Hall Residence Boiler #2	1.9 MMBTU/hr	Natural gas	After 1970
White Hall Residence Boiler #3	1.9 MMBTU/hr	Natural gas	After 1970
Liacouras Center Boiler #1	9.996 MMBTU/hr	No. 2 Oil Natural gas	1996
Liacouras Center Boiler #2	9.996 MMBTU/hr	No. 2 Oil Natural gas	1996
Liacouras Center Boiler #3	9.996 MMBTU/hr	No. 2 Oil Natural gas	1996
Edberg-Olsen Boiler	2.396 MMBtu/hr	No. 2 Oil Natural Gas	September 2000
Edberg-Olsen Water Heater #1	0.60 MMBtu/hr	Natural Gas	September 2000
Edberg-Olsen Water Heater #2	0.60 MMBtu/hr	Natural Gas	September 2000
Edberg-Olsen Water Heater #3	0.60 MMBtu/hr	Natural Gas	September 2000
Student Pavillion Boiler	2.887 MMBtu/hr	No. 2 Oil Natural Gas	September 2002
Temple Towers Pool Heater	0.85 MMBtu/hr	Natural Gas	

Appendix

Detailed Calculations Summary

The following costs are calculated in order to evaluate the cost effectiveness of each emission control technology:

- Total Capital Investment (TCI)

- NOx Emission Reduction (tons/yr)

- Cost Effectiveness ($/ton)

- **Capital Recovery** = Convert from P (present) to A(Annual amount), A=P(A/P,i%,n),

  $CR = \frac{i(1+i)^n}{(1+i)^n - 1}$ 7% interest and 20 yrs = A/P=0.0944; Annual Cost = TCI x CRF

<u>For the Catalyst</u>, The catalyst life is 5 years. The annual cost is given by the sinking fund factor, the amount of money the facility will need to set aside each year to be able to replace the catalyst at the end of its life, based on the lifespan of the catalyst and the interest rate.
Sinking Fund Factor (SFF) = Convert from F (Future) to A(Annual amount), A=F(A/F,i%,n),

$SFF = \frac{i}{(1+i)^n - 1}$ 10% interest and 5 yrs = A/F=0.1638

Where i= Annual interest Rate (10%); n= catalyst system life (5 years);

Catalyst Annual Cost = SFF x Catalyst Cost

$2NH_3 + 2NO_2 + O_2 \longrightarrow 3N_2 + 6H_2O$

<u>Cost of the Ammonia in SCR and SNCR (Based on EPA cost manual)</u>
$2NH_3 + 2NO + ½ O_2 \longrightarrow 2N_2 + 3H_2O$

Ammonia Cost = (17/30 * 2moles of NH_3/2 moles of NO2 *1.05 * NOx emission (tpy) *$410/ton)

NH_3 = Ammonia, NO_2 = Nitrogen Dioxide; O_2 = Oxygen; H_2O = Water; 1.05= Ammonia slip and excess ammonia

Appendix
Costs are provided in 2014 US $. SCR

BMCEP Boiler	**91.3 MMBTU/hr each**		
Total Capital Investment Cost (TCI)[1]	$812,363	Based on EPA Cost Control Manual of $6000/MMBTU/Hr. (section 4, Chapter 2 page 149) Escalate 1997 $ using the Marshall and swift Index	
Capital Recovery[1]	**$76,687**	**0.1993 (A/P)**	**CRF*TCI; n=20yrs i=7%** CFR=0.0944
Electricity Cost[1]	$45,552		65kw @ $0.08/kwh, 8760 hrs/yr
Maintenance[1]	$12,185.44		1.5%*TCI
Total catalyst Replacement Cost[1]	$28,283	0.1638 (A/F)	SFF x Catalyst Catalyst Cost= $172,667; Cost; SFF=0.1638
Ammonia Cost[1]	$3,781	NOx emission 15.5 tpy	= (17/30 * 2moles of NH_3/2 moles of NO2 *1.05 * NOx emission 15.5 (tpy) *$410/ton
Total Direct Annual Cost	**$89,802**		
Indirect Annual Cost			
Overhead[1]	$11,498		60% of maintenance-OAQPS[1]
Administrative Charge[1]	$16,247		2% of TCI[1]
Property Taxes[1]	$8,124		1% of TCI-[1]
Insurance[1]	$8,124		1% of TCI
Capital Recovery[1]	$76,687	0.0966	20 yrs @7% [1] A/p=0.0944
Total Indirect Annual Cost	**$120,680**		
Total Annual Operating Costs	**$210,481**		
NOx Emission Reduction (TPY)	13.2	85 % reduction.	Based on allowable 15.5 tons per rolling 12 month period
Cost Effectiveness ($/ton NOx removed)	**$15,976**		

Costs are provided in 2014 US $.

BMCEP Boiler	**91.3 MMBTU/hr**	**Total**	
SNCR			

Total Capital Direct Cost (DCI)[1] (SNCR system equipment, instrumentation, sales tax and freight. It also includes direct installation costs such as auxiliary equipment (e.g., ductwork, compressor), foundations and supports, handling and erection, electrical, piping, insulation and painting)	$369,188	Based on EPA Cost Control Manual Section 4.2 . Escalate 1998 $ using the Marshall and Swift Index	
Total Capital Indirect Cost (CIC) (includes costs such as; construction and contractor fees, startup and testing, inventory capital, and any process and project)	$73,838	EPA Cost Manual	
Contingency	$66,454	EPA Cost Manual	1.5*TCI
Total Capital Investment Cost	**$509,480**		**DCI+CCI**
[1]Electricity Cost	$2,102.4		3kw @ $0.08/kwh, 8760 hrs/yr
[1]Maintenance	$7,642		1.5% of TCI
[1]Ammonia Cost	$2,139	Based on annual NOx emission of 15.5 tpy	Ammonia cost =(17/30 * 1.05 *2 mole of Ammonia/2 mole of NO2 *NOx emission (tpy)(15.5 tons) *$410/ton
Total Direct Annual Cost	**$11,423**		
Indirect Annual Cost			
Overhead	$0		0% of maintenance-OAQPS[1]
Administrative Charge	$0		0 %f TCI-[1]
Property Taxes	$0		0 %f TCI-[1]
Insurance	$0		0 %f TCI-[1]
[1]Capital Recovery	$48,095	0.0944	CRF * TCI; n=20 yrs i=7%
Total Indirect Annual Cost	**$48,095**		
Total Annual Operating Costs	**$59,518**		
NOx Baseline Emissions (TPY)	15.5	Based on maximum allowable NOx emissions	
NOx Emission Reduction (TPY)	3.1	Based on 20 % reduction.	
Cost Effectiveness ($/ton NOx removed)	**$19,199/ton**		

Costs are provided in 2014 US $.

SCR

Standby-Engine Generators	**2250 HP**		
Total Capital Investment Cost (TCI)	$417,081	Based EPA Cost Control Manual of $125/hp-Hr. Escalate 1997 $ using the Marshall and swift Index	
Annual Operating Costs			
Direct Annual Cost			
Electricity Cost	$400		10kw @ $0.08/kwh, 500 hrs/yr
[1]Maintenance	$6,256.21		1.5%*TCI
Total catalyst Replacement Cost	$14,021	0.1638 (A/F)	SFF x Catalyst Catalyst Cost= $85,000; Cost; SFF=0.1638, n=5 i=10% ,
Ammonia Cost	$393	NOx emission 2.47 tpy	Ammonia cost =(17/30 * 1.05 *2 mole of Ammonia/2 mole of NO2 *NOx emission (tpy)(2.47 tons) *$410/ton
Total Direct Annual Cost	**$21,070**		
Indirect Annual Cost			
Overhead[3]	$656		60% of maintenance-OAQPS[1]
Administrative Charge	$8,342		2% of TCI-[1]
Property Taxes	$4,171		1% of TCI-[1]
Insurance	$4,171		1% of TCI-[1]
Capital Recovery	$39,372	0.0944	CRF * TCI; n=20 yrs i=7%
Total Indirect Annual Cost	**$59,809**		
Total Annual Operating Costs	**$80,880**		
NOx Emission Reduction (TPY)	1.97	80% reduction	Based on Maximum allowable NOx emissions of 2.47 tons per rolling twelve months
Cost Effectiveness ($/ton NOx	**$40,931**		

removed)

References:

[1]Office of Air Quality Planning and standards (OAQPS) Environmental Protection Agency (EPA) Air Pollution Control Manual, Six Edition, EPA/452/B-02-001, January 2002.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Kassahun Sellassie

Date: Sep 04, 2014

Subject: 1997 8-Hour RACT Analysis for Veolia-Energy Efficiency (PA) LLC

Introduction:

The Clean Air Act (CAA) requires that moderate (or worse) ozone nonattainment areas implement reasonably available control technology (RACT) controls on all major sources of Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx). Philadelphia County is part of the Philadelphia-Wilmington-Atlantic City moderate ozone nonattainment area for the 1997 8-hour ozone NAAQS. This document presents the findings of the reevaluation of NOx RACT for the 1997 8-hour ozone standard for this facility

Company Description:

Veolia Energy Efficiency PA (LLC), which owns and operates a steam generating facility at 2600 Christian Street, Philadelphia, PA 19146. The facility has two (2) new 297.91 MMBTU/hr boilers burning natural gas and No.2 fuel oil that were installed in 2013.

Applicability for NOx and VOC RACT:

Veolia –Schuylkill Station, Energy Efficiency is a major source of NOx due to having potential NOx emissions greater than 100 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone NAAQS. Veolia Energy Efficiency is also part owner of the adjacent Grays Ferry Cogeneration Partnership (GFCP) which owns and operates an electric generating unit facility at 2600 Christian Street, Philadelphia, PA 19146. GFCP started operating on July 27, 2000. Equipment used at GFCP includes one (1) front wall fired boiler, and one (1) combined cycle combustion turbine (CT). The RACT for GFCP has been evaluated in separate memo. They are not a major source of VOC, due to having potential VOC emissions not greater than 50 tons per year, the major source threshold in Philadelphia County that is applicable to NOx RACT for the 1997 8-hour ozone. Veolia Energy Efficiency is been evaluated for RACT for the first time.

RACT Evaluation:

The two 297.91 MMBTU/hr boilers burn natural gas and #2 oil. Each boiler is currently equipped with ULNB. Each boiler has the following NOx emission limits, Plan Approval # 10277A, dated on Feb13, 2013, each on a rolling 30-day average: 0.01 lbs/MMBTU while burning gas as during normal operation; 0.08 lbs/MMBTU while burning oil during normal operation; 0.036 lbs/MMBTU while burning gas during startup, shutdown, or malfunction (SSM); and 0.08 lbs/MMBTU while burning oil during startup, shutdown, or malfunction. The malfunction will be reported to AMS based on 127.441 and AMR I, section II.D.5 including nature and degree of malfunction, the emission of each pollutant, the duration and corrective action taken from CEM. The boilers have a combined NOx emission limit of 52.31 tons per rolling 12-month period. For SSM, 0.036 lbs NOx/MMBTU emission limits are not on a rolling 30-day average as it is for normal operating condition of 0.01 lb/MMBTU, which is a 30 days rolling average.

The following were considered possible additional NOx controls as RACT for the boilers: (1) Selective Catalytic Reduction (SCR), (2) Ultra Low-NOx Burners (ULNB) and Overfire Air (ULNB with OFA), (3) Selective Non-Catalytic Reduction (SNCR), and (4) Low NOx Burners (LNB).

SCR injects ammonia upstream of a catalyst. NOx, ammonia (NH3), and oxygen (O2) react on the surface of the catalyst to form nitrogen (N2) and water (H20). NOx emissions are reduced by around 80% for Boilers #1 and #2.

ULNB with OFA reduce NOx emissions by around 70% for Boilers #1 and #2

SNCR reduce NOx emissions by around 55% for Boilers #1 and #2

LNB are burners designed to create a larger, lower temperature flame. They would reduce NOx emissions by around 50% for Boilers #1 and #2.

The NOx emissions for Boilers #1 and #2 were determined based on the rated capacity of 297.91 MMBTU/hr, 8,760 hours per year, and a 0.0.08 lbs/MMBTU NOx emission limit. The NOx emissions are 104.4 tons per year for Boilers #1 and #2

The following NOx controls were determined technologically feasible for Boilers #1 and #2.

Source	Control Tec	Baseline NOx Emissions (tpy)	NOx Reduction (%)	NOx Reduction (tpy)	Total Annualized Cost ($)	Cost Effectiveness ($/Ton)
Boiler # 1and #2 (each)	SCR	104.4	80	83.52	928,749	11,120
	OFA	104.4	45	46.98	219,586	4,674
	SNCR	104.4	55	57.42	685,696	11,942
	LNB	104.4	50	52.2	238,597	4,571

These controls were determined economically unreasonable, because their respective cost-effectiveness is above $2,500/ton, which AMS has determined as the threshold for economic feasibility.

Because ULNB is currently installed on each boiler, it has been determined to be both technically and economically feasible for controlling NOx emissions of Boilers #1 and #2.

Conclusions and Recommendations:

- AMS has determined that the existing controls for Boilers #1 and #2 (ULNB) is NOx RACT for the 1997 8-hour ozone standard for Veolia Energy Efficiency LLC. AMS requests these requirements to be approved as RACT in the SIP. The emission limitation for Boilers #1 and #2 when firing oil is 0.08 lbs of NOx/MMBTU and 0.01 lb of NOx/MMBTU when firing gas and during SSM emission limitation for NG will be 0.036 lbs of NOx/mmbtu. The facility shall monitor and record compliance with the NOx emission limits. The facility shall monitor and record compliance based on NOX CEMs for Boilers #1 & #2. The facility shall monitor and record compliance with them based on daily hours of operation, fuel type, fuel usage, fuel sulfur content for each boiler, and NOX CEMs for both boilers.

RACT Calculations for Veolia-Energy Efficiency LLC- Boilers #1 and #2

Table 1- Detailed Calculations for SCR on Boilers #1 and #2

SCR, 297.91 MMBTU/hr Each			**Total capital Cost**
Total Capital Investment Cost (TCI)	$2,650,722		Based EPA Cost Control Manual of $6000/MMBTU/Hr. Escalate 1997 $ using the Marshall and swift Index (page 2-3)
Capital Recovery	**$632,197**	**0.2385**	**10 yrs @20% CRF=0.2385[1]**
Annual Operating Costs			
Direct Annual Cost[1]			
Electricity Cost[2]	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr
Operator[1]	$16,425		0.5hr/shift, 3 shift/day, $30/hr
Supervisor[1]	$2,463.75		15% of Operator
Maintenance[1]	$19,162.50		0.5hr/shift, 3 shift/day, $35/hr
Material[1]	$19,162.50		100% of Maintenance
	$49,165		Ammonia Cost=(17/46)*2*1.05*104.4*410*1.48
Annual Catalyst Replacement Cost[1]	$11,466		Catalyst Cost[1]= $70,000 Sinking Fund Factor = 0.1638 for 10% and 5 years
Total Direct Annual Cost	**$179,026**		
Indirect Annual Cost			
Overhead	$11,498		60% of maintenance-OAQPS[1]
Administrative Charge[3]	$53,014		2% of TCI-OAQPS[1]
Property Taxes[3]	$26,507		1% of TCI-OAQPS[1]
Insurance[3]	$26,507		1% of TCI-OAQPS[1]
Total Indirect Annual Cost	**$117,526**		
Total Annual Operating Costs	**$928,749**		
NOx Baseline Emissions (TPY)	104.4		Based on the rated capacity of 297.91MMBTU/hr, 8,760 hours per year, and a 0.08 lbs/MMBTU NOx emission limit.
NOx Emission Reduction (TPY)	83.52		Based on 80 % of NOx removed
Cost Effectiveness ($/ton NOx removed)	**$11,120**		

Table 2- Detailed Calculations for OFA on Boilers #1 and #2

Total Capital Investment Cost (TCI)	**$290,108**		TCI from original BART proposal from Veolia plus inflation adjustment .
Capital Recovery	**$69,191**	**0.2385**	**10 yrs @20% -OAQPS[1] A/p=0.2385**
Annual Operating Costs			
Direct Annual Cost			
Electricity Cost	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr (PA DEP RACT State Implementation Plan (SIP) revision, Sep, 2006, page 18)
Operator	$16,425		0.5hr/shift, 3 shift/day, $30/hr
Supervisor	$2,463.75		15% of Operator
Maintenance	$19,162.50		0.5hr/shift, 3 shift/day, $35/hr
Material	$19,162.50		100% of Maintenance
Total Direct Annual Cost	**$127,294**		
Indirect Annual Cost			
Overhead	$11,498		60% of maintenance-OAQPS[1]
Administrative Charge	$5,802		2% of TCI-OAQPS[1]
Property Taxes	$2,901		1% of TCI-OAQPS[1]
Insurance	$2,901		1% of TCI-OAQPS[1]
Total Indirect Annual Cost	**$23,102**		
Total Annual Operating Costs	**$219,586**		
NOx Emission Reduction (TPY)	46.98		
Cost Effectiveness ($/ton NOx removed)	**$4,674**		

Table 3 Detailed Calculations for SNCR on Boilers #1 and #2

SNCR 297.91 each MMBTU/hr each			**Total capital Cost**
Direct Capital Cost	$1,558,993		Based EPA Cost Control Manual (($950/mmmbtu/hr)*Qb(MMBTU/hr)*(2375 MMBTU/hr/Qb)^0.557*(0.66 + 0.85 uNOx). Qb= bolier size (mmbtu/hr); n = NOx removal efficiency (page 1-31)
Indirect Capital Cost	311,799		Based on EPA Cost Manual page 2-6
Total Capital Investment Cost (TCI)	$1,870,792		
Capital Recovery (annual cost)	**$446,184**	**0.2385**	**10 yrs @20% -OAQPS[1] A/p=0.2385**
Annual Operating Costs			
Direct Annual Cost			
Electricity Cost	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr (PA DEP RACT State Implementation Plan (SIP) revision, Sep, 2006, page 18)
Operator	$16,425		0.5hr/shift, 3 shift/day, $30/hr
Supervisor	$2,463.75		15% of Operator
Maintenance	$19,162.50		0.5hr/shift, 3 shift/day, $35/hr
Material	$19,162.50		100% of Maintenance
Ammonia	$38,362	0.1638	(A/F sinking value=0.1638) for 5 yrs and 10%
Total Direct Annual Cost	**$165,655**		
Indirect Annual Cost			
Overhead	$11,498		60% of maintenance-OAQPS[1]
Administrative Charge	$31,180		2% of TCI-OAQPS[1]
Property Taxes	$15,590		1% of TCI-OAQPS[1]
Insurance	$15,590		1% of TCI-OAQPS[1]
Total Indirect Annual Cost	**$73,857**		
Total Annual Operating Costs	**$685,696**		
NOx Emission Reduction (TPY)	57.42		
Cost Effectiveness ($/ton NOx removed)	**$11,942**		

Table 4 Detailed Calculations for LNB on Boilers #1 and #2

Total Capital Investment Cost (TCI)	$358,370		TCI from original BART proposal from Veolia plus inflation adjustment.
Capital Recovery	**$85,471**	**0.2385**	**10 yrs @20% -OAQPS[1] A/p=0.1993**
Annual Operating Costs			
Direct Annual Cost			
Electricity Cost	$70,080		100kw @ $0.08/kwh, 8760 hrs/yr (PA DEP RACT State Implementation Plan (SIP) revision, Sep, 2006, page 18)
Operator	$16,425		0.5hr/shift, 3 shift/day, $30/hr
Supervisor	$2,463.75		15% of Operator
Maintenance	$19,162.50		0.5hr/shift, 3 shift/day, $35/hr
Material	$19,162.50		100% of Maintenance
Total Direct Annual Cost	**$127,294**		
Indirect Annual Cost			
Overhead	$11,498		60% of maintenance-OAQPS[1]
Administrative Charge	$7,167		2% of TCI-OAQPS[1]
Property Taxes	$3,584		1% of TCI-OAQPS[1]
Insurance	$3,584		1% of TCI-OAQPS[1]
Total Indirect Annual Cost	**$25,832**		
Total Annual Operating Costs	**$238,597**		
NOx Emission Reduction (TPY)	52.2		
Cost Effectiveness ($/ton NOx removed)	**$4,571**		

References

1. Office of Air Quality Planning and standards (OAQPS), Environmental Protection Agency (EPA) Air Pollution Control Manual, Sixth Edition, EPA/452/B-02-001, January 2002.
2. Electricity cost: EPA cost manual, Appendix A-NOx Control Analysis
3. Capital Recovery = Convert from P (present) to A(Annual amount), A=P(A/P,i%,n),

   $CR = \frac{i(1+i)^n}{(1+i)^n - 1}$ 20% interest and 10 yrs = A/P=0.2385; Annual Cost =TCI * CFR
4. Catalyst Cost of SCR: The catalyst life is 5 years. The annual cost is given by the sinking fund factor (SFF). The SFF is the amount of money the facility will need to set aside each year to be able to replace the catalyst at the end of its life, based on the lifespan of the catalyst and the interest rate.

5. SFF = Convert from F (Future) to A(Annual amount), A=F(A/F,i%,n),

   $SFF = \frac{i}{(1+i)^n - 1}$ 10% interest and 5 yrs = A/F=0.1638

   Where i= Annual interest Rate (10%); n= catalyst system life (5 years);

   Catalyst Annual Cost = SFF x Catalyst Cost

6. Ammonia Cost:

   $4NH_3 + 2NO_2 + O_2 \longrightarrow 3N_2 + 6H_2O$

   Annual Ammonia Cost = (17/46 * 4moles of NH_3/2 moles of NO2 *1.05 * NOx emission (tpy) *$410/ton yrs)

   NH_3 = Ammonia, NO_2 = Nitrogen Dioxide; O_2 = Oxygen; H_2O = Water; 1.05= Ammonia slip and excess ammonia

RACT Plan Approvals

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
AIR MANAGEMENT SERVICES

RACT PLAN APPROVAL

Effective Date: July 27, 1999

Amended Date: Date

Expiration Date: None

Replaces Permit No. None

The RACT plan approval is subject to the following conditions:

In accordance with provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and after due consideration of a Reasonably Available Control Technology (RACT) proposal received under the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, of the rules and regulations of the Pennsylvania Department of Environmental Protection (PADEP), Air Management Services (AMS) approved the RACT proposal of the Facility below for the source(s) listed in section 1.A. Emission Sources of the attached RACT Plan Approval.

Facility:	Honeywell International
Owner:	Honeywell International
Location:	4700 Bermuda Street, Philadelphia, PA 19137-1193
Mailing Address:	4700 Bermuda Street, Philadelphia, PA 19137-1193
SIC Code(s):	2869
Plant ID:	1551
Facility Contact:	Paul Persing
Phone:	(215) 807-8442
Permit Contact:	Paul Persing
Phone:	(215) 807-8442
Responsible Official:	William F Rodebaugh
Title:	Plant Manager

_____ _____

Edward Wiener, Chief of Source Registration Date

The RACT plan approval is subject to the following conditions:

1. The purpose of this Plan Approval is to establish Nitrogen Oxides (NOx)/Volatile Organic Compound (VOC) Reasonably Available Control Technology (RACT) for Honeywell. This includes the following emission sources and control equipment:

A. Emission Sources

Boilers: Boiler #1 (260 MMBTU/hr), firing waste residue, gas or #6 fuel oil.
Boiler #2 (260 MMBTU/hr), firing waste residue, gas or #6 fuel oil.
Boiler #3 (381 MMBTU/hr), firing gas or #6 fuel oil only.
Boiler @ barge loading facility (< 250 MBTU/hr), firing #2 fuel oil.

~~(2) Oxidation processes: OX-501, OX-401, OX-301/302, OX-201/202.~~

~~(3) Distillation columns: CL-101, CL-111, CL-112, CL-113, CL-114, CL-120, CL-121 CL-200, CL-201, CL-203, CL-204, CL-205, CL-206, CL-208, CL-220, CL-300, CL-301, CL-302, CL-303, CL-304, CL-305, CL-306, CL-308, CL-601, PF-201, PF-301.~~

~~(4) Reactors. VT-208, VT-307, VT-612, VT-613, PFR-1, PFR-2, PFR-3~~

(5) Barge Loading.

~~(6) Tank Truck, Rail Car, and Drum Loading.~~

(7) Storage Tanks: VT-609, VT-610.

(8) Fugitive Emission Sources: pumps, valves, flanges, compressors, pressure relief valves, and rupture disks.

(9) Rail Car Cleaning

(10) Wastewater Facilities

B. Control Equipment

~~(1) Catalytic Oxidizer CR-601~~

(2) Thermal Oxidizer TR-602

~~(3) Packed Scrubber~~

~~(4) Internal Floating Roofs~~

~~(5) Jet Condensers~~

~~(6) Carbon Adsorbers~~

2. This approval requires and authorizes:

A. Boiler #1 and Boiler #2 shall only burn natural gas and waste phenol residue except if there is a natural gas curtailments and other losses of supply (e.g. PGW supply line failure or maintenance activity) or during stack testing programs (e.g. annual CEM RATA testing, annual combustion tuning, and combustion performance testing, as required). During such events No. 6 fuel oil may be used.

B. Honeywell shall operate Boiler #1 and Boiler #2 each on waste phenol residue and natural gas combined 51% or greater.

C. Boiler #3

- Boiler #3 can only burn No.6 oil during natural gas emergencies and stack test program (as defined under 2A above).

Boiler #3: Honeywell shall maintain and operate the low NO_X burners installed on Boiler #3 on May 31, 1995.

Honeywell shall perform, at a minimum, the annual combustion tuning specifications as cited in 25 PA 129.93(b)(2) through (5) for Boilers #1, #2, and #3.

~~Barge loading facility boiler: The boiler at the barge loading facility shall comply with presumptive RACT requirements of 25 PA 129.93(c).~~

~~OXIDATION PROCESSES:~~
~~RACT for the reactors at Honeywells shall be compliance with the New Source Performance Standards (NSPS) of Subpart III for SOCMI Oxidation. All VOC emissions for each oxidation process, listed in (A)(2) above, shall be controlled by an overall control efficiency of 98% or maintain a TRE > 1.~~

~~C. DISTILLATION COLUMNS:~~
~~RACT for the distillation columns at Honeywells shall be compliance with the New Source Performance Standards (NSPS) of Subpart NNN for Distillation columns. All VOC emissions for each distillation column, listed in (A)(3) above, shall be controlled by an overall control efficiency of 98% or maintain a TRE > 1.~~

~~D. REACTORS:~~
~~RACT for the reactors at Honeywells shall be compliance with the New Source Performance Standards (NSPS) of Subpart RRR for SOCMI Reactors. All VOC emissions for each reactor, listed in (A)(4) above, shall be controlled by an overall control efficiency of 98% or maintain a TRE > 1 or operate with a vent stream flow rate less than 0.011 scm/min.~~

E. BARGE LOADING:
Honeywells shall not load any VOC with a vapor pressure in excess of 1.5 psia at 20 degrees Celsius without Air Management Services' approval.

~~G. TRUCK, RAIL AND DRUM LOADING:~~
~~Truck, rail and drum loading at Honeywells are considered to be de minimis sources and not applicable to RACT.~~

H. STORAGE TANKS VT-609 and VT-610:
Internal floating roofs shall be installed and maintained on tanks VT-609 and VT-610. ~~All other storage tanks shall comply with New Source Performance Standards (NSPS) of Subparts K, Ka, or Kb, 25 PA 129.56, or 25 PA 129.57, which ever is applicable and more stringent.~~

~~I. FUGITIVE EMISSIONS SOURCES (EQUIPMENT LEAKS):~~
~~Honeywells shall implement a Leak Detection And Repair (LDAR) program for fugitive VOC emission sources not subject to 25 PA 129.71. At a minimum this would comply with Air Management Regulation V Section XIII (B) for Process Equipment Leaks.~~

J. RAIL CAR CLEANING:
Rail car cleaning emissions shall not exceed 2.7 tons per 12-month rolling period.

K. WASTEWATER FACILITIES:
The thermal oxidizer will control VOC emissions from the air stripper at the wastewater facility. The thermal oxidizer will have a destruction efficiency not less than 95%.

3. RACT Implementation Schedule

A. Upon issuance of this approval, Honeywell shall begin immediate implementation of the measures necessary to comply with the approved RACT proposal.

B. Sources proposing combustion tuning to comply with RACT requirements of 25 PA Code 129.91(f) shall perform the annual combustion tuning by December 31st of each year not to exceed 12 months between tunings.

C. Sources applicable to presumptive RACT requirements of 25 PA Code 129.93(b)(2) shall complete the annual adjustment or tune-up by December 31st of each year not to exceed 12 months between tunings.

D. Sources that have Low NOx Burners to comply with RACT requirements of 25 PA Code 129.91(f) shall perform combustion tuning annually by December 31st of each year not to exceed 12 months between tunings.

4. Stack Emission Limitations

A. The emission rates for each Boiler #1& #2 shall not exceed 0.35 pounds of NOx per MMBTU and the combined NOx emissions shall not exceed 272 tons per year. The emission rate of Boiler #3 shall not exceed 0.3 pounds of NOx per MMBTU

5. RACT Implementation Schedule

A. Upon issuance of this approval, Honeywells Company, Inc. shall begin immediate implementation of the measures necessary to comply with the approved RACT proposal.

6. <u>Testing Requirements</u>

A. Honeywells Company, Inc. must perform NO_X Emission tests on Boiler #3 to determine NOx emission performance rates for newly installed low NO_X burners. The tests shall be performed within 90 days of each unit startup.

B. At least (60) days prior to the test, the Honeywells shall submit to AMS for approval the procedures for the test and a sketch with dimensions indicating the location of sampling ports and other data to ensure the collection of representative samples.

C. At least thirty (30) days prior to the test, the AMS shall be informed of the date and time of the test in order that representatives of these offices may observe the conduct of the tests.

7. Recordkeeping and Reporting Requirements

A. Honeywells shall maintain a file containing all the records and other data that are required to be collected to demonstrate compliance with NO_X /VOC RACT requirements of 25 PA Code 129.91-129.94.

B. The records shall provide sufficient data and calculations to clearly demonstrate that the requirements of §129.91-129.94 are met.

C. Data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.

D. Records shall be retained for at least five years and shall be made available to the AMS on request.

E. <u>Continuous nitrogen oxides and oxygen monitors and recorders shall be operated on Boiler # 1, Boiler #2, and Boiler #3 in order to measure and record the concentrations of these gases emitted from the boiler stack.</u>

8. The operation of the aforementioned sources shall not at any time result in the emission of visible air contaminants in excess of the limitations specified in Section 123.41, particulate matter in excess of the limitations specified in Section 123.11 or sulfur oxides in excess of the limitations specified in Section 123.22, all Sections of Chapter 123 of Article III of the Rules and Regulations of the Department of Environmental Resources, or in the emission of any of these or any other type of air contaminant in excess of the limitations specified in, or established pursuant to, any other applicable rule or regulation contained in Article III.

9. The company shall not impose conditions upon or otherwise restrict the AMS's access to the aforementioned source(s) and/or any associated air cleaning device(s) and shall allow the AMS to have access at any time to said source(s) and associated air cleaning device(s) with such measuring and recording equipment, including equipment recording visual observations, as the AMS deems necessary and proper for performing its duties and for the effective enforcement of the Air Pollution Control Act.

10. Revisions to any emission limitations incorporated in this RACT Approval will require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code §129.91(h).

NOTE: Wording with ~~strikethrough~~ font is NOT being submitted for SIP approval.

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
AIR MANAGEMENT SERVICES

RACT PLAN APPROVAL

Effective Date: May 29, 1995

Amended Date: DATE

Expiration Date: None

Replaces Permit No.: "1-Hr RACT Plan Approval for "GATX Terminal Corporation," effective On May 29, 2995 and approved by EPA on October 31, 2001 in 66 FR 54936

In accordance with provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and after due consideration of a Reasonably Available Control Technology (RACT) proposal received under the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, of the rules and regulations of the Pennsylvania Department of Environmental Protection (PADEP), Air Management Services (AMS) approved the RACT proposal of the Facility below for the source(s) listed in section 1.A. Emission Sources of the attached RACT Plan Approval.

Facility:	Kinder Morgan Liquid Terminals, LLC
Owner:	Kinder Morgan Liquid Terminals, LLC
Location:	3300 North Delaware Ave., Philadelphia, PA 19134
Mailing Address:	3300 North Delaware Ave., Philadelphia, PA 19134
SIC Code(s):	2911
Plant ID:	05003
Facility Contact:	Tom Stafiniak
Phone:	(215) 634-3031
Permit Contact:	Tom Stafiniak
Phone:	(215) 634-3031
Responsible Official:	Don Krain
Title:	Terminal Manager

Edward Wiener, Chief of Source Registration **Date**

~~(1) (1) Tank car / truck loading racks connected to the NAO Thermal Oxidation Unit: Racks - A, B, E, F, M, & V.~~
~~(2) (2) All uncontrolled tank car / truck loading racks (Racks - C, D, G, H, N, O, P, R, R-1, T, & X)~~
~~(3) (3) 13.4 MMBTU/hr boiler~~
~~(4) (4) 6.7 MMBTU/hr boiler~~
~~(5) (5) Thermal Oxidation Unit~~
~~(6) (6) Oil / water separator~~
~~(7) (7) 14 volatile organic compound storage tanks, volume less than 40,000 gallons.~~
~~(8) (8) 81 volatile organic compound storage tanks, volume greater than 40,000 gallons.~~
~~(9) (9) Fugitive sources:~~
~~(10) a.) 110 pumps~~
~~(11) b.) 1,375 valves~~
~~(12) c.) 2,810 flanges~~
~~(13) (10) marine vessel loading operation, two loading berths~~

~~In accordance with provisions of the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, Air Managment Services (AMS) has approved the RACT proposal plans for GATX on the above indicated air contamination source(s).~~

The RACT plan approval is subject to the following conditions:

1. ~~1.~~ The purpose of this Plan Approval is to establish Nitrogen Oxides (NOx)/Volatile Organic Compound (VOC) Reasonably Available Control Technology (RACT) for Kinder Morgan Liquid Terminals, LLC~~GATX~~. This includes the following emission sources and control equipment:

~~A. A.~~ Emission Sources:
~~B.~~A.
(1) Tank car / truck loading racks connected to the NAO Thermal Oxidation Unit: Racks - A, D, E, F, & M;
(2) All uncontrolled tank car / truck loading racks;
(3) 12.6 MMBTU/hr boiler;
(4) 13.4 MMBTU/hr boiler;
(5) 490 hp emergency generator;
(6) 27storage tanks, volume less than 40,000 gallons;
(7) 81storage tanks, volume greater than 40,000 gallons;
(8) Fugitive emissions from process piping pumps, valves, & flanges;
(9) Marine vessel loading operation, two loading berths.
~~(1) Tank car / truck loading racks connected to the NAO Thermal Oxidation Unit: Racks - A, B, E, F, M, & V.~~
~~(2) All uncontrolled tank car / truck loading racks: (Racks - C, D, G, H, N, O, P, R, R-1, T, & X)~~
~~(3) 13.4 MMBTU/hr boiler~~
~~(4) 6.7 MMBTU/hr boiler~~
~~(5) Oil / water separator~~
~~(6) Fugitive sources:~~
~~a.) 110 pumps~~
~~b.) 1,375 valves~~
~~c.) 2,810 flanges~~
~~(7) marine vessel loading operation, two loading berths~~

~~C. B.~~ Control Equipment:
~~D.~~B.
(1) NAO Thermal Oxidation Unit;
- This unit captures VOC emissions at the tank truck/tank car loading operations.

(2) Vapor Combustor.
- This unit captures cumene vapors from the marine vessel loading operations.

~~(1) NAO Thermal Oxidation Unit~~

2. ~~2.~~ This approval authorizes:

~~A. A. The operation of the following equipment in accordance with the presumptive RACT requirements of 25 PA Code SS129.93(c)(l):~~

~~B.~~

~~(1) (1) 13.4 MMBTU/hr boiler~~

~~(2) (2) 6.7 MMBTU/hr boiler~~

~~C. B. The operation of the following equipment in accordance with the presumptive RACT requirements of 25 PA Code SS129.93(c)(4):~~

~~(1) (1) NAO Thermal Oxidation Unit~~

~~D.~~A. ~~C. Tank car/truck loading racks - A, B, E, F, M, & V shall comply with 25 PA Code 129.59~~Volatile Organic Compounds (VOC) with a Reid Vapor Pressure greater than or equal to 4.0 psi shall be loaded at racks A, E, F, M, or D and shall comply with the requirements of 25 PA Code 129.59(a).

~~E.~~B. ~~D. Tank car/truck loading racks - C, D, G, H, N, O, P, R, R-1, T, & X which are uncontrolled shall be limited to processing organic liquid with vapor pressure lower than 4 RVP~~All volatile organic liquids loaded at uncontrolled rack positions at the facility must have a Reid Vapor Pressure (RVP) less than 4.0.

~~F.~~C. ~~E.~~ The implementation of a quarterly leak detection and repair program on all pumps valves and flanges containing VOC.

D. ~~F.~~ The marine vessel loading shall not process petroleum distillate with vapor pressures greater than 4.0 RVP.

~~(1)~~

3. ~~3.~~ Emission Limitations

A. ~~A.~~ The maximum air contaminant emissions from these sources, controlled by the equipment above shall be limited to:

~~B.~~A.

~~(1) (1) Tank car/truck loading racks - C, D, G, H, N, O, P, R, R-1, T, & X which are uncontrolled shall be limited to 129 tons of VOC per year.~~All uncontrolled tank car/truck loading positions at the facility shall be limited to 129 tons of VOC per year.

~~(2)~~(1)

(2) ~~(2)~~ The operation of the marine vessel loading shall be limited to 59 tons of VOC per year.

B. The maximum air contaminant emissions from these sources shall be limited to:

(1) Each individual uncontrolled tank car/truck loading positions at the facility shall be limited to 70 tons of VOC per year.

4. Presumptive RACT

A. The following presumptive RACT requirements will not be submitted to the State Implementation Plan (SIP):

(1) The operation of the following equipment in accordance with the presumptive RACT requirements of 25 PA Code SS129.93(c)(l):

i. 13.4 MMBTU/hr boiler;

ii. 12.6 MMBTU/hr boiler.

(2) The operation of the following equipment in accordance with the presumptive RACT requirements of 25 PA Code SS129.93(c)(4):

i. NAO Thermal Oxidation Unit

ii. Vapor Combustor

(3) The operation of the following equipment in accordance with the presumptive RACT requirements of 25 PA Code SS129.93(c)(5):

i. 490 hp emergency generator.

(4) The operation of the following equipment in accordance with the presumptive RACT requirements of 25 PA Code SS129.56 and the CTG requirements of AMR V, Section II:

i. 81 storage tanks, volume greater than 40,000 gallons.

(5) The operation of the following equipment in accordance with the presumptive RACT requirements of 25 PA Code SS129.57:

i. 31 storage tanks, volume less than 40,000 gallons.

~~4.~~5. ~~4.~~ RACT Implementation Schedule

A. ~~A.~~ Upon issuance of this approval, Kinder Morgan Liquid Terminals, LLC~~GATX~~ shall begin immediate implementation of the measures necessary to comply with the approved RACT proposal but no later than May 31, 1995. ~~but no later than **May 31, 1995.**~~

~~5.~~6. ~~5.~~ Monitoring Requirements

A. ~~A. GATX~~Kinder Morgan Liquid Terminals, LLC shall monitor all valves, pumps, and flanges ~~quarterly for visual leaks. GATX shall also monitor valves, pumps, and flanges which process organic liquid greater than or equal to 4 RVP~~in VOC service quarterly for visual leaks of greater than 10,000 ppmv.

~~A.~~B. ~~B.~~ Kinder Morgan Liquid Terminals, LLC~~GATX~~ shall monitor throughput of material processed and vapor pressures for all tanks, marine loading, and tank car/truck loading racks on a daily basis.

~~6.~~7. ~~6.~~ Recordkeeping and Reporting Requirements

A. Kinder Morgan Liquid Terminals, LLC shall keep daily records of throughputs of each material processed and the corresponding vapor pressures for all tanks, marine loading, and tank car/truck loading racks.

B. Kinder Morgan Liquid Terminals, LLC shall keep record of all quarterly visual leak inspections. Should any leaks greater than 10,000 ppmv be identified, the Permittee shall keep records of all corrective actions taken.

C. ~~A.~~ Kinder Morgan Liquid Terminals, LLC~~GATX~~ shall monitor and maintain a file containing all the records and other data that are required to be collected to demonstrate compliance with ~~NOx/~~VOC RACT requirements.
~~requirements of 25 PA Code SS129.91-129.94.~~

~~A.~~D. ~~B.~~ The records shall provide sufficient data and calculations to clearly demonstrate that the VOC RACT requirements ~~of SS129.91-129.94~~ are met.

~~B.~~E. ~~C.~~ Data of information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.

~~C.~~F. ~~D.~~ Records shall be ~~retained for at least two~~kept for at least five (5) years and shall be made available to AMS on request.

~~7.~~8. ~~7.~~ The operation of the aforementioned source(s) shall not at any time result in the emission of visible air contaminants in excess of the limitations specified in Section 123.41, particulate matter in excess of the limitations specified in Section 123.11 or sulfur oxides in excess of the limitations specified in Section 123.22, all Sections of Chapter 123 of Article III of the Rules and Regulations of the Pennsylvania Department of Environmental Resources, or in the emission of any of these or any other type of air contaminant in excess of the limitations specified in, or established pursuant to, any other applicable rule or regulation contained in Article III.

~~8.~~9. ~~8.~~ Revisions to any emission limitations incorporated in this RACT Approval will require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code SS129.91(h).

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
AIR MANAGEMENT SERVICES
DRAFT RACT PLAN APPROVAL

Effective Date: XXXX
Amended Date: XXXX
Expiration Date: None
Replaces Permit No.None

In accordance with provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and after due consideration of a Reasonably Available Control Technology (RACT) proposal received under the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, of the rules and regulations of the Pennsylvania Department of Environmental Protection (PADEP), Air Management Services (AMS) approved the RACT proposal of the Facility below for the source(s) listed in section 1.A. Emission Sources of the attached RACT Plan Approval.

Facility:	Paperworks, LLC
Owner:	Paperworks Industries, inc
Location:	5000 Flat Rock Road, Philadelphia, PA 19127
Mailing Address:	5000 Flat Rock Road, Philadelphia, PA 19127
SIC Code(s):	2631
Plant ID:	01566
Facility Contact:	Frank DelGrego
Phone:	(215) 984-7000
Permit Contact:	Frank DelGrego
Phone:	(215) 984-7000
Responsible Official:	Frank DelGrego
Title:	General Manager

_____ _____
Edward Wiener, Chief of Source Registration Date

The RACT plan approval is subject to the following conditions:

1) The purpose of this plan approval is to establish Nitrogen oxide and (NOx) Reasonably available control technology (RACT) for Paperworks, LLC. This includes the following emission source and control equipment.

A. Emission Sources

~~(i) Boiler #1:Riley boiler with a capacity of 240 MMBTU/hr. The boiler currently fires coal or #6 oil and is adding the capability to burn natural gas.~~

(i) Boiler#1, Riley boiler with heat input rating of 240 MMBTU/hr and firing natural gas as primary fuel and #6 oil fuel as a back-up

~~(ii) Boiler #2: Riley boiler with a capacity of 225 MMBTU/hr. The boiler currently fires coal or #6 oil and is adding the capability to burn natural gas.~~

~~(iii)Four Infrared Heaters: Propane fueled infrard radiation heaters that are used as dryers for a millboard. Each heater has a capacity of 2.9MMBTU/hr.~~

(iv)Boiler #3: Rated 92.27 MMBTU/hr and burn No. 6 oil and natural gas equipped with Low NOx burners (LNB) and flue gas recirculation (FGR).

(v) Boiler #4: Rated 92.27 MMBTU/hr and burn No. 6 oil and natural gas equipped with Low NOx burners (LNB) and flue gas recirculation (FGR).

2) Emission Limts

~~(i) Each boiler shall be installed with low NOx burners and flue gas recirculation.~~

~~(ii) Emissions from each boiler shall not exceed the following: [25 Pa Code §127.1]~~

~~(a) NOx: 0.0.20lbs/MMBTU while burning natural gas and~~

~~(b) 0.30 lbs/MMBTU while burning NO.6 oil~~

~~(c) 0.50lb/MMBTU 30days rooling average~~

~~(d) Total 1,018 tons/yr~~

(iii)NOx emissions from boiler #1 shall not exceed the following:

(a) 0.20lbs/MMBTU 30 day rolling average when burning natural gas and

(b) 0.30 lbs/MMBTU 30 day rolling average while burning NO.6 oil

(iv)Emission from Boiler #3&#4 shall not exceed the following;

(a) 0.025 lbs/MMBTU while burning natural gas

3) **Control Equipment**

~~(i) Boiler #1 has a cyclone inside the boiler; a flue gasdesulfurization unit and a baghouse. The company willinstall low NOx burners with overfire air.~~

~~(ii) Boiler #2 has a cyclone inside the boiler; an electrostatic precipitator and a baghouse. The company will install low NOx burners with overfire air~~

(iii)Boiler #1 shall be installed with Low NOx gas burners with over fire air and modification of oil burners to Low NOx design with over fire air

(iv)Boiler #3&#4 shall be equipped with LNB and FGR

~~(v)~~

4) Work Practice Standard
   (i) Boiler No.1 shall only burn natural gas and No.6 fuel oil. Boiler #1 shall burn #6 oil for no more than 168 hours per rolling 12-month period, solely for emergency, and to keep pipes from freezing in case of natural gas interruption.
   (ii) Boiler No.3 & 4 shall only burn natural gas.

5) Testing Requirements

~~A. Within 90 days of the installtion f low NOx burners, JSC/CCA must conduct intal emissions performance test of the boilers to dominstrate complince with the emission above~~

~~B. JSC/CCA shall obtain approval of the test protocol prior to the test date. AMS must be notied at least 30 days prior to the actual testing in order that representative from the agency may schedual to observe the conduct of the tests.~~

C. Continuse, nitrogen oxides, and oxygen monitors and recorders shall be installed and operted in order to measure and record the concentrations of these gases emitted from the boilr stacks. The continuse emission monitors must conform to USEPA performance specifications in 40 CFR part 60, Appendix B and PA. DER continuse Source Monitering Manual Rev. No.4, July 1987

D. Paperworks shall conduct a NOx performance test on each boiler whene requested by AMS

~~Paperworks shall obtain approval of the test protocol prior to the test date. AMS must be notified at least 30 days prior to the actual testing in order that representatives from the agency may schedule to observe the conduct of the tests.~~

6) <u>Monitoring, Recordkeeping and Reporting Requirements</u>

A. Paperwork shall monitor and keep records of the monthly fuel usage for each boiler, and per rolling 12-month period, calculated monthly in a rolling 12-month period,

B. The permittee shall maintain a file containing all the records and other data that are required to be collected to de monstrate compliance with NOx/VOC RACT requirements of 25 PA Code 129.91 - 129.94.

C. B.The records shall provide sufficient data and calculations to clearly demonstrate that the requirements of §129.91-129.94 are met.

D. Data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.

E. Records shall be retained for at least five years and shall be made available to AMS on request.

F. ~~The operation of the aforementioned sources shall not at any time result in the emission of visible air contaminants in excess of the limitations specified in Section 123.41, particulate matter in excess of the limitations specified in Section 123.11 or sulfur oxides in excess of the limitations specified in Section 123.22, all Sections of Chapter 123 of Article III of the Rules and Regulations of the Department of Environmental Resources, or in the emission of any of these or any other type of air contaminant in excess of the limitations specified in, or established pursuant to, any other applicable rule or regulation contained in Article III.~~

G.

H. The company shall not impose conditions upon or otherwise restrict AMS's access to the aforementioned source(s) and/or any associated air cleaning device(s) and shall allow AMS to have access at any time to said source(s) and associated air cleaning device(s) with such measuring and recording equipment, including equipment recording visual observations, as the Department deems necessary and proper for performing its duties and for the effective enforcement of the Air Pollution Control Act.

I. Revisions to any emission limitations incorporated in this RACT Approval will require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code §129.91(h)

7) RACT Implementation Schedule

A. Upon issuance of this approval Paperwork shall begin immediate implementation of the measures necessary to comply with the approved RACT proposal.

~~B. JSC/CCA shall opertate NOx controles on boiler #1 and boiler #2 by october 31, 1995~~

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
AIR MANAGEMENT SERVICES
DRAFT RACT PLAN APPROVAL

Effective Date: May 27, 1995

Amended Date: XXXX

Expiration Date: None

Replaces Permit No. XXXX

In accordance with provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and after due consideration of a Reasonably Available Control Technology (RACT) proposal received under the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, of the rules and regulations of the Pennsylvania Department of Environmental Protection (PADEP), Air Management Services (AMS) approved the RACT proposal of the Facility below for the source(s) listed in section 1.A. Emission Sources of the attached RACT Plan Approval.

Facility:	Temple University – Health Sciences Campus
Owner:	Temple University
Location:	3401 North Broad Street Philadelphia, PA 19140
Mailing Address:	1009 West Montgomery Ave, Philadelphia, PA 19122
SIC Code(s):	8221
Plant ID:	08906
Facility Contact:	Kurt A. Bresser
Phone:	(215) 204-4515
Permit Contact:	Kurt A. Bresser
Phone:	(215) 204-4515
Responsible Official:	Andy Riccardi
Title:	Facilities Management

Edward Wiener, Chief of Source Registration Date

The RACT plan approval is subject to the following conditions:

~~1) The purpose of this plan approval is to establish Nitrogen oxide and (NOx) Reasonably available control technology (RACT) for Temple University, Health Science center. This includes the following emission source and control equipment~~.

1) This plan approval amends the Reasonably Available Control Technology (RACT) plan approval, approved by EPA, and issued to Temple University, Health Sciences Campus on May 27, 1995. It establishes new Nitrogen Oxides (NOx) RACT conditions for Boilers #1, #2, and #3.

A. Emission Sources

(i) Boiler #1: The Central Steam Plant (CSP) Boiler #1 is a Keeler CP units with heat input 76.4 MMBTU/hr that combust both natural gas and #6 fuel oil

(ii) Boiler #2: The Central Steam Plant (CSP) Boiler #2 is a Keeler CP units with heat input 76.4 MMBTU/hr that combust both natural gas and #6 fuel oil

(iii) Boiler #3: The Central Steam Plant (CSP) Boiler #2 is a Keeler CP units with heat input 76.4 MMBTU/hr that combust both natural gas and #6 fuel oil

~~(iii)(iv) The Econo-Therm Medical Waste incinerator has a maxiumum rated heat capacity of 3.7 MMBTU/hr and is equiped with two natural gas burners each rated at 800,000 Btu/hr~~

B. ~~Control Equipment~~

(i) ~~Flue gas recirculation and low excess air combustion will be implemented on one of the three Keeler boilers~~

2) **This approval and authorizes**

(i) ~~Central Steam Plant Boiler #2 shall utilize flue gas recirculation and low excess air combustion. Central Steam Plant Boilers #1 and #3 shall each have a fuel flow governing device that limits the fuel input to less than 50 MMBTU/hr.~~

A. Installation of the following

(i) CCA burner modifications shall be performed on each boiler, including each of the following:

(ii) Installation of staged flame stabilizers (a.k.a. swirlers).

(iii) Redesign and replacement of the atomizers.

(iv) Replacement of the center-fired gas injection rings with gas manifolds having center-fired and poker gas injection.

(v) Installation of a NO_x tempering system (water injection).

C. Emission limits

(i) The combined heat input for Boilers #1, #2, and #3 shall not exceed 673,894 MMBTU per rolling 12-month period.

(ii) Nitrogen Oxides (NOx)emissions from each boiler shall not exceed the following

(a) 0.067 lbs/MMBTU while burning natural gas.

(b) 0.40 lbs/MMBTU while burning No.6 fuel oil

(c) Nitrogen Oxides (NO_x) emissions from Boilers #1, #2, and #3 combined shall not exceed 56.3 lbs/hr.

During the ozone season; between (May 1 – September 30), each boiler shall burn natural gas as the primary fuel. Each boiler may only burn No. 6 fuel oil during periods of gas curtailment or gas supply interruption. Veolia-Energy Efficiency (PA) LLC
(2600 Christian Street) Veolia-Energy Efficiency (PA) LLC
(2600 Christian Street) Veolia-Energy Efficiency (PA) LLC
(2600 Christian Street) Veolia-Energy Efficiency (PA) LLC
—(2600 Christian Street)

(iii)

Stack Emission Limitations

0)3) **Testing Requireme**nts

A. Within 90 days of maxiumum operations but not later than 180 days of startup, Temple Univeristy must conduct performance testing of the NOx emission control system to optimize the control efficiency of the flue ga recirculation and low excess air system.
B. At least (30) days prior to the test, Temple universtiy shall sumbit to AMS for approval the proceduer for the test and sketch with diamentions indication the loctation of sampling ports and other data to ensure the collection of representative samples.
A. Temple University – Health Sciences Campus -shall conduct a NOx performance test on one of the three boilers every five years and whenever requested by AMS.

0)4) **Monitoring, Recordkeeping and Reporting Requirements**

A. Temple University shall maintain a file containing all the records and ther data that are required to be collected to demonstrate compliance with NOx RACT requirement of 25 PA Code §129.91-129.94
B. The records shall provide sufficient data and calculations to clearly demonstrate that the requirements of §129.91-129.94 are met
C. Data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.
A. Temple shall monitor and record the monthly fuel usage for each boiler
B. The Permittee shall monitor and record verification of compliance with the NOx emission limits. Compliance with the NOx limit shall be based on AMS approved stack test data.
C. Temple shall keep records of the fuel manifests documenting the nitrogen content of No. 6 fuel oil.
D. Hourly records of NOx emissions from the boilers calculated on a weekly basis.
E. Records of the reasoning of burning fuel oil during the ozone season (May 1 – September 30),
F. Temple shall monitor and record the combined heat input of the boilers per rolling 12-month period.

G. Records shall be retained for at least two years and shall be made available to AMS on request.

H. The operating of the aforementioned source shall not at any time result in the emission of visible air contaminant in excess of the limitations specified in section 123.41, particulate matter in excess of the limitations specified in section 123.11 or sulfur oxides in excess of the limitations specified in section 123.22, all Sections of Chapter 123 of Article III of the rules

and regulations of Pennsylvania Department of Environmental Resources, or in the emission of any of these or any of these or any other type of air contaminant in excess of the limitations specified in, or established pursuant to, any other applicable rule or regulation contained in Article III.

. The company shall not impose conditions upon or otherwise restrict AMS's access to the aforementioned source(s) and/or any associated air cleaning device(s) and shall allow AMS to have access at any time to said source(s) and associated air cleaning device(s) with such measuring and recording equipment, including equipment recording visual observations, as the Department deems necessary and proper for performing its duties and for the effective enforcement of the Air Pollution Control Act.

. I. Revisions to any emission limitations incorporated in this RACT Approval will require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code §129.91(h).

5) Presumptive RACT Source

A. Each boiler, emergency generator and fire pump shall be installed, operated and maintained in accordance with the manufacturer's specifications

B. Each emergency generator and fire pump shall operate less than 500 hours per rolling 12-month period.

C. Monitoring and Recordkeeping Requirements

(i) Temple Health shall monitor and keep records of the proper operation of the boilers, emergency generators and fire pump in accordance with manufacturers recommended operations and maintenance

(ii) Temple Health shall monitor and keep records of fuel usage for each boiler emergency generator and fire pumps

(iii) Temple Health shall monitor and keep records of operating hours of each emergency generator and fire pumps

3. RACT Implementation Schedule

A. Upon issuance of this approval Temple University – Health Sciences Campus shall begin immediate implementation of the measures necessary to comply with the approved RACT proposal.

~~B. Temple university shall modify the fuel trains on Keeler Boillers #1 &#3 with fuel governing device by June 31, 1996~~

~~C. Temple University shall install and operate NOx control of flur gas recirculation and low excess air combustion on Keeler boiler #2 by May 31, 1996.~~

NOTE: Wording with ~~strikethrough~~ font is NOT being submitted for SIP approval.

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
AIR MANAGEMENT SERVICES

RACT PLAN APPROVAL

Effective Date: August 1, 2000

Amended Date: October 7, 2002, February 19, 2014, DATE

Expiration Date: None

Replaces Permit No. None

In accordance with provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and after due consideration of a Reasonably Available Control Technology (RACT) proposal received under the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, of the rules and regulations of the Pennsylvania Department of Environmental Protection (PADEP), Air Management Services (AMS) approved the RACT proposal of the Facility below for the source(s) listed in section 1.A. Emission Sources of the attached RACT Plan Approval.

Facility:	Philadelphia Energy Soultions Refining and Marketing LLC (PES)
Owner:	Philadelphia Energy Soultions Refining and Marketing LLC
Location:	Girard Point Processing Area located at 3001 Penrose Ave Point Breeze Processing Area located at 3144 Passyunk Ave
Mailing Address:	3144 Passyunk Ave., Philadelphia, PA 19145
SIC Code(s):	2911
Plant ID:	1501 and 1517
Facility Contact:	Charles Barksdale
Phone:	(215) 339-2074
Permit Contact:	~~Charkes~~ Charles Barksdale
Phone:	(215) 339-2074
Responsible Official:	Nithia Thaver and James Keeler
Title:	General Managers

_____ _____

Edward Wiener, Chief of Source Registration Date

The RACT plan approval is subject to the following conditions:

1. The purpose of this Plan Approval is to establish Nitrogen Oxides (NOx)/Volatile Organic Compound (VOC) Reasonably Available Control Technology (RACT) for PES Girard Point Processing Area and Point Breeze Processing Area. This includes the following emission sources and control equipment:

A. Emission Sources

(1) Process Heaters: Unit 137: F1 heater (415 MMBTU/hr)
F2 heater (155 MMBTU/hr)
F3 heater (60 MMBTU/hr)
Process heaters F1 and F2 burn refinery fuel gas~~ or refinery fuel oil~~. Heater F3 burns refinery fuel ~~oil~~gas.

(2) Process Heater: Unit 231: B-101 heater ~~ Heater~~ (104.5 MMBTU/hr) fires refinery fuel gas.

(3) Process Heater: Unit 433: H-1 heater (243 MMBTU/hr) Heater fires refinery fuel gas.

(4) Process Heaters: Unit 1332: H-400 heater (186 MMBTU/hr)
H- 401 heater (233 MMBTU/hr)
~~H-600 heater (21.3 MMBTU/hr)~~
~~H-601 heater (48 MMBTU/hr)~~
~~H-602 heater (49 MMBTU/hr)~~
~~H-1 heater (45 MMBTU/hr)~~
H-2 heater (60 MMBTU/hr)
~~H-3 heater (43 MMBTU/hr)~~
These heaters burn refinery fuel gas.

(5) Process Heater: Unit 1232: B-104 heater (70 MMBTU/hr) Heater fires refinery fuel gas.

(6) Boiler House #3: Boiler #37 (495 MMBTU/hr)
~~Boiler #38 (495 MMBTU/hr)~~ removing
Boiler #39 (495 MMBTU/hr)
Boiler #40 (660 MMBTU/hr)
These boilers fire refinery fuel gas~~ or refinery fuel oil~~.

(7) ~~Sludge Incinerator 8832: Unit was 44 MMBTU/hr and burned refinery fuel gas or refinery fuel oil.~~

(8) ~~Sulfur Recovery Unit 532: SO2 incinerator was 16 MMBTU/hr. Unit burned refinery fuel gas.~~

(9) ~~1232 FCCU CO Boiler: CO waste gas combustion unit (580 MMBTU/hr) burns process waste gas, refinery fuel gas and refinery fuel oil.~~

(10) ~~Asphalt Heater: H1 (12.8 MMBTU/hr)~~
~~H2 (12.8 MMBTU/hr)~~
~~H3 (12.8 MMBTU/hr)~~
~~H5 (12.8 MMBTU/hr)~~
~~These heaters burned fire refinery fuel gas.~~ removing

(11) Crude Unit 210: Section A HTR H101 (192.0 MMBTU/hr)
Section B HTR H201 (254.0 MMBTU/hr
Section C HTR 13H1 (235.4 MMBTU/hr)
These heaters above fire refinery fuel gas.

(12) Hydrocracker Unit 859: HTR 1H1 (~~76~~ 98 MMBTU/hr) Unit fires refinery fuel gas~~ and refinery fuel oil~~.

~~HTR 1H2 (70 MMBTU/hr) Unit fires refinery fuel gas and refinery fuel oil~~. removing
~~HTR 1H3 (211 MMBTU/hr) Unit fires refinery fuel gas and refinery fuel oil~~. removing
~~HTR 1H4 (19 MMBTU/hr) Unit fires refinery fuel gas.~~

(13) Reformer Unit 864: ~~HTR PH3 (80 MMBTU/hr)~~ removing
~~HTR PH5 (90 MMBTU/hr)~~ removing
HTR PH1 (80 MMBTU/hr)
~~HTR PH2 (45 MMBTU/hr)~~
~~HTR PH4 (57 MMBTU/hr)~~ removing
~~HTR PH7 (45.5 MMBTU/hr)~~
HTR PH11 (74 MMBTU/hr)
HTR PH12 (85.1 MMBTU/hr)
These heaters fire refinery fuel gas ~~and refinery fuel oil~~.

(14) ~~Hydrogen Plant 861: HTR 3H1S (123 MMBTU/hr)~~ removing
~~HTR 3H1N (125 MMBTU/hr)~~ removing
~~These heaters burned refinery fuel gas.~~ removing

(15) Distillate HDS Unit 865: HTR 11H1 (87.3 MMBTU/hr after installation of ULNBs)
~~HTR 11H2~~ HTR 11H2 (64.2 MMBTU/hr)
These heaters fire refinery fuel gas.

(16) ~~Gas Oil HDS Unit 866: HTR 12H1Heater fires refinery fuel gas~~. Gas-Oil HDS Unit 866: HTR 12H1Heater (61.2 MMBTU/hr) fires refinery fuel gas

~~(17) 22 Boiler House: Boiler #1 (169 MMBTU/hr)~~ removing
~~Boiler #2 (169 MMBTU/hr)~~ removing
~~Boiler #3 (203 MMBTU/hr)~~ removing
~~These three boilers burn only refinery fuel gas or natural gas and are equipped with Ultra Low NOx Burners.~~ removing

(18) Reformer Unit 860: HTR 2H3 (174.67 MMBTU/hr) Unit fires refinery fuel gas ~~and refinery fuel oil~~.
HTR 2H5 (155 MMBTU/hr) Unit fires refinery fuel gas ~~and refinery fuel oil~~.
~~HTR 2H1 (49 MMBTU/hr) Unit fires refinery fuel gas and refinery fuel oil.~~
HTR 2H2 (69.78 MMBTU/hr) Unit fires refinery fuel gas ~~and refinery fuel oil~~.
HTR 2H4 (99.44 MMBTU/hr) Unit fires refinery fuel gas ~~and refinery fuel oil~~.
~~HTR 2H6 (36.7 MMBTU/hr) Unit fires refinery fuel gas and refinery fuel oil.~~
HTR 2H7 (59 MMBTU/hr) Unit fires refinery fuel gas ~~and refinery fuel oil~~.
~~HTR 2H8 (49.6 MMBTU/hr) Unit fires refinery fuel gas and refinery fuel oil.~~
~~Boiler 2H9 (165 MMBTU/hr) Unit fires refinery fuel gas or natural gas.~~ removing

~~(19) 868 FCCU HTR 8H101 (49.5 MMBTU/hr) Unit fires refinery fuel gas.~~ 868 FCCU HTR 8H101 Unit fires refinery fuel gas

(20) 868 FCCU Catalyst Regenerator

~~(21) 867 Sulfur Recovery Unit Incinerator~~

~~(22) Emergency Flares~~

(23) Cooling towers

(24) Fugitive leaks: valves, flanges, compressors, pumps, pipes.

(25) Unit 870: HTR H01 (97 MMBTU/hr)
HTR H02 (53 MMBTU/hr
These heaters fire refinery fuel gas.

(26) Unit 1232 FCCU

(27) Diesel-fired Reciprocating Internal Combustion Engines (RICE):
IC-002 53P-800C pump (200 bhp)
IC-005 FE-5(2) Flood Control Pump Driver (28 bhp)
IC-006 Godwin 894572/4 Flood Control Pump Driver (115 bhp)
IC-007 B-2623 Flood Control Pump Driver (102 bhp)
IC-008 Engine Set 1290 (northside of 8 Sep) (214 bhp)

B. Control Equipment

(1) Ultra-low NOx burner (ULNB) systems are installed on the following sources to control NOx emissions:
Unit 433 H-1 heater
Unit 1232 B-104 heater
#3 Boiler House boilers #37, ~~#38,~~ #39, and #40.
Unit 210 H201 heater
Unit 870 H01 and H02 heaters
Unit 859 1H1 heater
Unit 137 F-3 heater
Unit 1332 H-2 heater.

Flue Gas Recirculation (FGR) is also installed on #3 Boiler House boilers #37, #39, and #40.

Selective Catalytic Reduction (SCR) shall be installed on Unit 1332 H-400 and H-401 heaters.

2. This approval requires and authorizes:

A. The installation of the Ultra Low NOx Burners on 433 H-1 heater, 1232 B-104 heater, #3 Boiler House boilers #37, ~~#38,~~ #39, and #40, and 210 H201 heater to comply with RACT requirements. The installation of the burners has been completed.

i. The installation of Ultra Low NOx Burners on 231 B101 heater and 865 11H1 heater to comply with RACT requirements after the issuance of this plan approval.

B. PES will use combustion tuning to comply with RACT requirements for the following heaters:

Unit 137: F1 heater, F2 heater, F3 heater

Unit 1332: H-400 heater, H-401 heater, H-2 heater
Crude Unit: 210A HTR H101, 210C HTR 13H1
Hydrocracker Unit 859: HTR 1H1, HTR 1H2, HTR 1H3
Reformer Unit 864: HTR PH3, HTR PH5, HTR PH1, HTR PH2, HTR PH4, HTR PH11, HTR PH12
~~Hydrogen Plant 861: HTR 3H1S, HTR 3H1N~~
Distillate HDS Unit 865: HTR 11H2
Reformer Unit 860: HTR 2H3, HTR 2H5, HTR 2H4, HTR 2H2, HTR 2H7
~~Gas Oil HDS Unit 866: HTR 12H1(43 MMBTU/hr)~~ Gas Oil HDS Unit 866: HTR 12H1~~(43 MMBTU/hr)~~
Unit 868: HTR 8H101

C. All fuel burning sources will be capped at the heat input specified in the table below. If PES desires to raise the cap, a RACT evaluation will have to be performed at that new heat input. The economic evaluation will be made using cost of living increases. Changes will require a resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code §129.9(h). Modifications or changes may require additional controls or more strict emission limits depending on the applicable regulation triggered as a result of the modification or change.

		Heat Input

Process Unit	Source	Cap (MMBTU/hr)
Unit 137:	F1 heater	415
	F2 heater	155
Unit 433:	H-1 heater	243
Unit 1332:	H-400 heater	186
Unit 1232:	B-104 heater	70
Boiler House #3:	Boilers #37, ~~#38,~~and #39	495
	Boiler #40	660
~~Hydrocracker Unit 859:~~	~~HTR 1H1~~	~~76~~
	~~HTR 1H2~~	~~70~~
Reformer Unit 864:	~~HTR PH3~~	~~80~~
	~~HTR PH5~~	~~90~~
	HTR PH2	45
	~~HTR PH4~~	~~57~~
~~Hydrogen Plant 861:~~	~~HTR 3H1S~~	~~123~~
	~~HTR 3H1N~~	~~125~~

D. PES shall monitor all fuel input to all heaters and boilers with BTU limitations on a daily basis to insure capacity limits are not exceeded or PES shall install fuel limiting devices on the heaters or boilers to keep capacities below allowable. The compliance method must be in place by June 30th 2000.

E. ~~All fuel combustion sources with heat input equal to or greater than 20 MMBTU/hr and less than 50 MMBTU/hr shall comply with applicable presumptive RACT requirements of 25 PA Code 129.93(b)(2) (5). All fuel combustion sources with heat input less than 20 MMBTU/hr shall comply with presumptive RACT requirements of 25 PA Code 129.93(c).~~

~~F. RACT for 22 Boiler House: Boiler #1, Boiler #2, and Boiler #3 is combustion tuning.~~

~~G. RACT for Reformer Unit 860 HTR 2H9 is combustion tuning.~~

H. The 868 FCCU NOx emissions shall be limited to 100 ppmdv @ 0% O_2 on a 7-day rolling average ~~569~~ 130.2 tons per rolling 365-day period~~year calculated on a 365-day rolling average basis~~. PES shall follow good combustion practices controlling the level of excess oxygen and CO promoter in the regenerator to minimize NOx emissions from the regenerator. A NOx Continuous Emission Monitoring System (CEMS) shall be operated on the unit.

I. The 1232 FCCU shall have Selective Catalytic Reduction (SCR). NOx emissions shall not exceed 40 ppmdv @ 0% O_2 on a 7-day rolling average and 208.28 tons per rolling 365-day period. A NOx Continuous Emission Monitoring System (CEMS) shall be operated on the unit.

J. PES shall utilize an inspection and maintenance/monitoring program for VOC fugitive emissions from cooling towers.

K. PES shall utilize a fugitive emissions leak detection and repair program (LDAR) for all valves, pumps, flanges, and compressors in VOC service. All applicable equipment shall be tagged by May 31, 1995. Monitoring of components shall begin by July 31, 1995 and shall be conducted on a quarterly basis (gaseous service) and an annual basis (liquid service) for all sources not covered under an existing LDAR program.

L. ~~The 1232 FCCU CO Boiler: CO waste gas combustion unit (580 MMBTU/hr) shall comply with the presumptive RACT requirements of 25 PA Code 129.93(c)(4), which is installation, maintenance and operation of the source in accordance with manufacturers specifications.~~

M. Each RICE unit shall be operated with good combustion practices.

3. RACT Implementation Schedule

A. Upon issuance of this approval, PES shall begin immediate implementation of the measures necessary to comply with the approved RACT proposal.

B. Sources proposing combustion tuning to comply with RACT requirements of 25 PA Code 129.91(f) shall perform the annual combustion tuning by December 31st of each year not to exceed 12 months between tunings.

C. Sources applicable to presumptive RACT requirements of 25 PA Code 129.93(b)(2) shall complete the annual adjustment or tune-up by December 31st of each year not to exceed 12 months between tunings.

D. Sources proposing installing Ultra Low NOx Burners to comply with RACT requirements of 25 PA Code 129.91(f) shall perform combustion tuning annually by December 31st of each year not to exceed 12 months between tunings.

E. The installation of Ultra Low NOx Burners on 231 B101 heater and 865 11H1 heater to comply with RACT requirements by August 19, 2015~~within 18 months after the DATE amendment of this plan approval~~. The 231 B101 heater shall be limited to 91 MMBTU/hr until the burners are installed. The 865 11H1 heater shall be limited to 72.2 MMBTU/hr until the burners are installed. The 0.03 lbs/MMBTU NOx emission limit listed below for each unit will not become applicable until the burners are installed.

4. Testing Requirements and Stack Emission Limitations

A. For units installing ULNB, PES shall conduct performance tests for NOx. The results of these tests have been submitted to AMS.

B. The final NOx RACT emission limits for the #3 Boiler House boilers, 137 Unit F1 heater, #~~22 Boiler House boilers: #1, 2, & 3~~, and Unit 210 H201 heater, ~~Unit 231 B101 heater, Unit 865 11H1 heater, and the 860 unit Boiler 2H9~~ have been established through the use of Department approved Continuous Emission Monitoring System (CEMS). Compliance with the limitations listed below will be on a 30-day rolling average based on hourly averages of CEM data for the Unit 137 F1 heater and ~~, except for the Unit 210 H201 heater, Unit 231 B101 heater, and Unit 865 11H1 heater, which will be~~ on a 365-day rolling average based on hourly averages of CEM data for the other units. The limits for the Unit 231 B101 heater and Unit 865 11H1 heater are not applicable until the Ultra Low NOx Burners are installed.

Source	Limitation
Boiler House #3 – boilers #37, #38, #39, and #40	~~0.330~~0.040 lbs. NOx/MMBTU
137 Unit F1 heater	0.230 lbs. NOx/MMBTU
~~Reformer Unit 860 Boiler 2H9~~	~~0.20 lbs. NOx/MMBTU~~
~~#22 Boiler House – boilers #1, #2, and #3~~	~~0.20 lbs. NOx/MMBTU~~
Unit 210 H201 heater	0.03 lbs. NOx/MMBTU
Unit 231 B101 heater	0.03 lbs. NOx/MMBTU
Unit 865 11H1 heater	0.03 lbs. NOx/MMBTU
Process Heater Unit 1332 H-400 heater	0.06 lbs. NOx/MMBTU
Process Heater Unit 1332 H-401 heater	0.06 lbs. NOx/MMBTU

C. Compliance with emission limits for combustion sources listed below shall be determined by quarterly stack sampling with a portable NOx analyzer. After one year sampling, PES may petition AMS for semi-annual monitoring. AMS may, at any time, require three one-hour stack tests per fuel type for each unit where fuels can be fired separately. AMS may, at any time, require three one-hour stack tests for dual-fuel type combustion sources where both fuels must be fired at the same time and compliance with emission limits will be through the use of one set of three one-hour stack tests.

	Limitation (lbs. NOx/MMBTU)	
Source	Gas	~~Oil~~
Process Heater Unit 433 H-1 heater	0.060	~~N/A~~
~~Process Heater Unit 1332 H-400 heater~~	~~0.156~~	~~N/A~~
~~Process Heater Unit 1332 H-401 heater~~	~~0.156~~	~~N/A~~
Crude Unit 210A HTR H101	0.089	
Crude Unit 210C HTR 13H1	0.104	~~0.4~~

~~Hydrocracker Unit 859 HTR 1H3~~	~~0.134~~	~~0.4~~
~~Hydrogen Plant 861 HTR3H1S~~	~~0.133~~	~~N/A~~
~~Hydrogen Plant 861 HTR3H1N~~	~~0.133~~	~~N/A~~
F-2 @ 137 Unit	0.257	~~0.4~~
F-3 @ 137 Unit	~~N/A~~0.060	~~0.4~~
B-101@ 231 Unit	0.122	~~N/A~~
H-2 @ 1332 Unit	~~0.300~~0.040	~~N/A~~
B-104 @ 1232 Unit	0.177	~~N/A~~
1H-1 @ 859 Unit	~~0.123~~0.035	~~0.4~~
~~1H-2 @ 859 Unit~~	~~0.123~~	~~0.4~~
~~PH-3 @ 864 Unit~~	~~0.284~~	~~0.4~~
~~PH-5 @ 864 Unit~~	~~0.283~~	~~0.4~~
PH-1 @ 864 Unit	0.167	~~0.4~~
~~PH-4 @ 864 Unit~~	~~0.102~~	~~0.4~~
PH-11 @ 864 Unit	0.145	~~0.4~~
PH-12 @ 864 Unit	0.119	~~0.4~~
11H-1 @ 865 Unit	0.113	~~0.4~~
2H-3 @ 860 Unit	0.163	~~0.4~~
2H-5 @ 860 Unit	0.163	~~0.4~~
2H-2 @ 860 Unit	0.350	~~0.4~~
2H-4 @ 860 Unit	0.270	~~0.4~~
2H-7 @ 860 Unit	0.157	~~0.4~~
Unit 865 11H2 heater	0.113	~~N/A~~
Unit 866 12H1 heater	0.113	~~N/A~~
Unit 868 8H101 heater	0.113	~~N/A~~
H01 @ 870 Unit	0.035	
H02 @ 870 Unit	0.035	

D. All annual combustion tuning shall at a minimum meet the requirements set forth in 129.93 (b)(2) through (5).

E. At least thirty (30) days prior to a performance NOx test, PES shall inform AMS of the date and time of the scheduled test.

F. PES shall conduct performance tests to determine compliance with the lbs NOx/MMBTU emission limits of this plan approval for the following heaters:

i. Within 180 days of the installation of ULNBs for the Unit 231 B101 Heater and the Unit 865 11H1 Heater.

ii. ~~Within 180 days of the DATE amendment of this plan approval~~By August 19, 2015 for the Unit 210 H101 Heater, Unit 865 11H2 Heater, Unit 866 12H1 Heater, and Unit 868 8H101 Heater.

iii. Testing shall be conducted in accordance with 25 Pa. Code Chapter 139

G. The Unit 210 H201 Heater shall be equipped with continuous monitors and recorders for NOx and O_2. The continuous monitors and recorders shall meet the requirements of 25 Pa. Code Chapter 139.

H. Each heater listed below shall be limited to the following rolling 365-day heat input limits:

i. Unit 231 B101 Heater shall not exceed 856,000 MMBTU on a rolling 365-day basis.
ii. Unit 865 11H1 Heater shall not exceed 699,000 MMBTU on a rolling 365-day basis.
iii. Unit 865 11H2 Heater shall not exceed 500,000 MMBTU on a rolling 365-day basis.
iv. Unit 210 H101 Heater shall not exceed 1,643,000 MMBTU on a rolling 365-day basis.
v. Unit 210 H201A/B Heater shall not exceed 2,172,000 MMBTU on a rolling 365-day basis.
vi. Unit 866 12H1 Heater shall not exceed 456,000 MMBTU on a rolling 365-day basis.
vii. Unit 868 8H101 Heater shall not exceed 480,000 MMBTU on a rolling 365-day basis.

5. Recordkeeping and Reporting Requirements

A. The permittee shall maintain a file containing all the records and other data that are required to be collected to demonstrate compliance with NOx/VOC RACT requirements of 25 PA Code 129.91 - 129.94.

B. The records shall provide sufficient data and calculations to clearly demonstrate that the requirements of §129.91-129.94 are met.

C. Data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.

D. Records shall be retained for at least two years and shall be made available to the Department on request.

6. ~~The operation of the aforementioned sources shall not at any time result in the emission of visible air contaminants in excess of the limitations specified in Section 123.41, particulate matter in excess of the limitations specified in Section 123.11 or sulfur oxides in excess of the limitations specified in Section 123.22, all Sections of Chapter 123 of Article III of the Rules and Regulations of the Department of Environmental Resources, or in the emission of any of these or any other type of air contaminant in excess of the limitations specified in, or established pursuant to, any other applicable rule or regulation contained in Article III.~~

7. The company shall not impose conditions upon or otherwise restrict the Department's access to the aforementioned source(s) and/or any associated air cleaning device(s) and shall allow the Department to have access at any time to said source(s) and associated air cleaning device(s) with such measuring and recording equipment, including equipment recording visual observations, as the Department deems necessary and proper for performing its duties and for the effective enforcement of the Air Pollution Control Act.

8. Revisions to any emission limitations incorporated in this RACT Approval will require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code §129.9(h).

NOTE: Wording with ~~strikethrough~~ font is NOT being submitted for SIP approval.

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
AIR MANAGEMENT SERVICES

RACT PLAN APPROVAL

Effective Date: July 27, 1999

Amended Date: DATE

Expiration Date: None

PA Permit Number: 51-4922

In accordance with provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and after due consideration of a Reasonably Available Control Technology (RACT) proposal received under the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, of the rules and regulations of the Pennsylvania Department of Environmental Protection (PADEP), Air Management Services (AMS) approved the RACT proposal of the Facility below for the source(s) listed in section 1.A. Emission Sources of the attached RACT Plan Approval.

Facility:	Philadelphia Gas Works, Richmond Plant
Owner:	City of Philadelphia
Location:	3100 E. Venango St. Philadelphia, PA 19134
Mailing Address:	3100 Passyunk Avenue, Philadelphia, PA 19145
SIC Code(s):	4925
Plant ID:	4922
Facility Contact:	James McLaughlin~~Robert H. Bohlman~~
Phone:	(215) 787-5065~~(215) 427-4065~~
Permit Contact:	Lisa Popovics~~Michael W. Handwerk~~
Phone:	(215) 684-6551~~(215) 787-4849~~
Responsible Official:	Raymond Snyder~~Abdol R. Nayak~~
Title:	Director, Gas Processing~~Manager, Gas Processing~~

_____ ~~July 27, 1999~~

~~Thomas Huynh, Regulatory Services Manager~~Edward Wiener, Chief of Source Registration

Date

The RACT plan approval is subject to the following conditions:

1. The purpose of this Plan Approval is to establish Nitrogen Oxides (NOx) Reasonably Available Control Technology (RACT) for PGW This includes the following emission sources and control equipment:

   A. Emission Sources:

Unit Description	Fuel Type	Full Rated Capacity
~~Four Clark HLA -8T (C2A, C2B, C3A, C3B)~~	~~Natural Gas~~	~~2,350 horsepower~~ removing
LNG vaporization Heater	Natural Gas	94.1 MMBTU/hr
LNG vaporization Heater	Natural Gas	94.1 MMBTU/hr
LNG vaporization Heater	Natural Gas	96.6 MMBTU/hr
LNG vaporization Heater	Natural Gas	102.1 MMBTU/hr
LNG vaporization Heater	Natural Gas	105.0 MMBTU/hr
LNG vaporization Heater	Natural Gas	105.0 MMBTU/hr
~~Two Standby Clark HLA -8T (C1A, C1B)~~	~~Natural Gas~~	~~2,350 horsepower~~ removing
~~Two Standby Ingersoll-Rand boiloff compressors KVG-83FL/HL~~	~~Natural Gas~~	~~800 horsepower~~ removing
~~Three Caterpillar Engines 135G2U~~	~~Natural Gas~~	~~295 horsepower~~
~~Two Kewannee Boilers Model H3S100G~~	~~Natural Gas~~	~~4.2 MMBTU/hr~~
~~H2 Econotherm J 66-457 Boil off Heater~~	~~Natural Gas~~	~~4.5 MMBTU/hr~~
~~Two 1H7 09 and 1H710 Facility Heaters~~	~~Natural Gas~~	~~9.2 MMBTU/hr~~
~~H3 Econotherm J 66-390 Regenerate Gas Heater~~	~~Natural Gas~~	~~11 MMBTU/hr~~
~~Two AO Smith HAW 1340690 Under-tank Heating Systems~~	~~Natural Gas~~	~~1 MMBTU/hr~~
~~Gas Turbine Solar CS1 SB3316 Boiloff Compressor~~	~~Natural Gas~~	~~11.5 MMBTU/hr~~
~~Gas Turbine Solar Saturn T1021S 12G Electric Generator~~	~~Natural Gas~~	~~13.7 MMBTU/hr~~

   B. Control Equipment

   (1) ~~Four Clark HLA -8T 2,350 horsepower Units (C2A, C2B, C3A, and C3B) shall be retrofitted with new high energy ignition systems, AFR controls, a turbocharger system enhancement along with new fuel valves.~~ removing

   (2) Limit the following units' operating schedule to five percent of their maximum operating capacity:

   LNG vaporization Heater 94.1 MMBTU/hr
   LNG vaporization Heater 94.1 MMBTU/hr
   LNG vaporization Heater 96.6 MMBTU/hr
   LNG vaporization Heater 102.1 MMBTU/hr
   LNG vaporization Heater 105.0 MMBTU/hr
   LNG vaporization Heater 105.0 MMBTU/hr
   ~~Two Standby Clark HLA -8T 2,350 horsepower (C1A, C1B) Units~~ removing
   ~~Two Standby Ingersoll-Rand boiloff compressors KVG-83FL/HL 800 horsepower Units~~ removing

   (3) Set and maintain the timing of the three Caterpillar Engines 135G2U 295 horsepower Units engine at four degree retarded relative to the standard timing.

2. This approval requires and authorizes:

   A. ~~Four Clark HLA -8T 2,350 horsepower units, respectively C2A, C2B, C3A and C3B shall be retrofitted with new high-energy ignition systems, AFR controls, a turbocharger system enhancement along with new fuel valves.~~ removing

   B. ~~Based on a rolling 12-month period, the annual fuel consumption for the four Clark HLA -8T 2,350 horsepower units shall be limited to 570 MMCF of natural gas.~~ removing

C. PGW shall comply with the requirements as specified in the RACT requirements of 25 PA Code 129.91(f); pertaining to expeditious compliance.

D. The following sources shall comply with presumptive RACT requirement requirements of 25 PA Code 129.93(c)(5):

(1) Calculated on a 12-month rolling period the total annual fuel usage for the Six LNG vaporization Heaters 103 MMBTU/hr Units is limited to 257 MMCF of natural gas.

~~(2) Calculated on a 12-month rolling period, the annual fuel usage for the Two Standby Clark HLA -8T 2,350 horsepower (C1A, C1B) Units shall be limited to 14.8 MMCF of natural gas.~~ removing

~~(3)~~(2) ~~Calculated on a 12-month rolling period, the annual fuel usage for Two Standby Ingersoll -Rand boiloff compressors KVG-83FL/HL -800 horsepower Units is limited to 6.7 MMCF of natural gas.~~ removing

~~E. The three Caterpillar Engines 135G2U 295 horsepower Units shall comply with presumptive RACT requirement of 25 PA Code 129.93 (c)(3) by maintaining the timing at four degree retarded relative to standard timing.~~

~~F. The following sources shall comply with presumptive RACT requirement of 25 PA Code 129.93 (c)(1):~~

~~(1) Two Kewannee Boilers Model H3S100G 4.2 MM BTU/hr~~
~~(2) H2 Econotherm J 66-457 Boil off Heater 4.5 MMBTU/hr~~
~~(3) Two 1H7 09 and 1H710 Facility Heaters 9.2 MM BTU/hr~~
~~(4) H3 Econotherm J 66-390 Regenerate Gas Heater 11 MMBTU/hr~~
~~(5) Two AO Smith HAW 1340690 Under-tank Heating Systems 1 MMBTU/hr~~

~~G. The following sources shall comply with presumptive RACT requirement of 25 PA Code 129.93 (c)(2):~~

~~(1) Gas Turbine Solar CS1-SB3316 Boiloff Compressor 11.5 MMBTU/hr~~
~~(2) Gas Turbine Solar Saturn T1021S-12G Electric Generator 13.7 MMBTU/hr~~

3. Emission Limitations:

A. ~~The maximum air contaminant emissions from the equipment listed in the "Sources" section of this RACT Permit shall have the following limitations:~~ removing

(1) ~~Nitrogen Oxides (NOx):~~ removing

a) ~~Each of the four Clark HLA -8T 2,350 horsepower units (C2A,C2B, C3A, C3B) shall have individual stack emission limitations of 5grams per Brake Horse Power per Hour for Oxides of Nitrogen (NOx). Compliance with these limitations shall be demonstrated by using appropriate emission calculation procedures which are approved by AMS. (See 5.Testing Requirements).~~ removing

b) ~~Each of the four Clark HLA -8T 2,350 horsepower units (C2A,C2B, C3A, C3B) shall have individual stack emission limitations of 25.9 lbs. of Oxides of Nitrogen (NOx) per hour. Compliance with these limitations shall be demonstrated by using appropriate emission calculation procedures, which are approved by AMS. (See 5.Testing Requirements).~~ removing

c) ~~The four Clark HLA -8T 2,350 horsepower units (C2A, C2B, C3A, and C3B) shall have a total emission limitation of 320 tons of Oxides of Nitrogen (NOx) per year, calculated on a 12-month rolling period. Compliance with these limitations shall be demonstrated by using appropriate emission calculation procedures that are approved by AMS. (See 5.Testing requirements)~~ removing

4. RACT Implementation Schedule:

A. Upon issuance of this approval, PGW shall begin immediate implementation of the measures necessary to comply with this RACT permit.

B. ~~PGW shall operate NOx controls on the Four Clark HLA_8T Units (C2A, C2B, C3A, and C3B) by May 31, 1997.~~ removing

5. Testing Requirements:

A. ~~PGW must conduct performance testing on the Four Clark HLA_8T Units (C2A,C2B, C3A, and C3B) once every five years to demonstrate compliance with this RACT permit. Compliance testing shall be performed between the calendar period of July 1 and September 1 of each scheduled test year.~~ removing

B. ~~PGW shall submit to AMS a proposed stack testing protocol at least (60) days prior to the scheduled date for that stack testing.~~ removing

C. If at any time AMS has cause to believe that air contaminant emissions from any source(s) listed in Section A of this permit may be in excess of the limitations specified in this permit, or established pursuant to, any applicable rule or regulation contained in 25 PA Code Article III, the Permittee shall be required to conduct whatever tests are deemed necessary by AMS to determine the actual emission rate(s).

6. Monitoring Requirements:

A. ~~Engine mapping conducted in conjunction with the initial compliance testing of the Clark HLA-8T 2350 horsepower units shall be used to establish coefficients for the control algorithms of each engine, including air/fuel ratio, ignition timing and air manifold temperature control.~~ removing

7. Recordkeeping and Reporting Requirements:

A. PGW shall maintain a file containing all the records and other data that are required to be collected to demonstrate compliance with NOx RACT requirements of 25 PA Code §129.91- 129.94.

B. The records shall provide sufficient data and calculations to clearly demonstrate that the requirements of §129.91-129.94 are met.

C. Data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.

D. Records shall be retained for at least two years and shall be made available to AMS on request.

~~8. The operation of the aforementioned sources shall not at any time result in the emission of visible air contaminants in excess of the limitations specified in Section 123.41, particulate matter in excess of the limitations specified in Section 123.11 or sulfur oxides in excess of the limitations specified in Section 123.22, all Sections of Chapter 123 of Article III of the Rules and Regulations of the Pennsylvania Department of Environmental Resources, or in the emission of any of these or any other type of air contaminant in excess of the limitations specified in, or established pursuant to, any other applicable rule or regulation contained in Article III.~~

9. The company shall not impose conditions upon or otherwise restrict the AMS' access to the aforementioned source(s) and/or any associated air cleaning device(s) and shall allow AMS to have access at any time to said source(s) and associated air cleaning device(s) with such measuring and recording equipment, including equipment recording visual observations, as AMS deems necessary and proper for performing its duties and for the effective enforcement of the Air Pollution Control Act.

10. Revisions to any emission limitations incorporated in this RACT Approval shall require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code §129.91(h).

NOTE: Wording with ~~strikethrough~~ font in NOT being submitted for SIP approval.

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
AIR MANAGEMENT SERVICES

RACT PLAN APPROVAL

Effective Date: April 20, 1999

Amended Date: DATE

Expiration Date: None

PA Permit Number: 51-3887

In accordance with provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and after due consideration of a Reasonably Available Control Technology (RACT) proposal received under the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, of the rules and regulations of the Pennsylvania Department of Environmental Protection (PADEP), Air Management Services (AMS) approved the RACT proposal of the Facility below for the source(s) listed in section 1.A. Emission Sources of the attached RACT Plan Approval.

Facility:	Cardone Industries
Owner:	Cardone Industries
Location:	5660 Rising Sun Avenue, Philadelphia, PA 19120 (Plants 11-14)
Mailing Address:	5501 Whitaker Avenue, Philadelphia, PA 19124
SIC Code(s):	3714
Plant ID:	03887
Facility Contact:	Glenn DePalantino
Phone:	(215) 912-3538
Permit Contact:	Glenn DePalantino
Phone:	(215) 912-3538
Responsible Official:	George Zauflik
Title:	Sr. VP of Compliance

Edward Wiener, Chief of Source Registration Date

Source(s): Miscellaneous degreasing operations with; miscellaneous products including adhesives, solvents, aerosols, architectural and touch-up sprays;

In accordance with provisions of the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, Air Management Services (AMS) has approved the RACT proposal plans for Cardone on the above indicated air contamination source(s).

The RACT plan approval is subject to the following conditions:

1. The purpose of this Plan Approval is to establish Volatile Organic Compound (VOC) Reasonably Available Control Technology (RACT) for Cardone. This includes the following emission sources and control equipment:

A. Emission Sources

(1) Degreasing operations with solvent re-processing and storage: Stoddard solvent is used in degreasing operations. Used solvent is sent to a reprocessing area for recovery and storage.

(2) Miscellaneous architectural coatings.

~~B. Control Equipment~~

~~(1) Non-contact refrigerated condenser~~

2. This approval authorizes:

~~A. The installation of the non-contact refrigerated condenser on solvent re-processing and storage vents to comply with RACT requirements of 25 PA Code 129.91(f).~~

B. All architectural coating used at Cardone shall comply with Air Management Regulation V, Section VIII.

3. RACT Implementation Schedule

A. Upon issuance of this approval, Cardone shall begin immediate implementation of the measures necessary to comply with the approved RACT proposal.

~~B. Cardone shall install the refrigerated vapor condenser on its solvent re-processing and storage tanks by May 30th, 1995.~~

~~4. Testing Requirements~~

~~A. Cardone must perform VOC emission tests on the vapor condenser to determine emission rates from the condenser vent. The tests shall be performed within 60 days of the unit startup.~~

~~B. At least (60) days prior to the test, the Cardone shall submit to AMS for approval, the procedures for the test and a sketch with dimensions indicating the location of sampling ports and other data to ensure the collection of representative samples.~~

~~C. At least thirty (30) days prior to the test, the AMS shall be informed of the date and time of the test.~~

5. Recordkeeping and Reporting Requirements

A. Cardone shall maintain a file containing all the records and other data that are required to be collected to demonstrate compliance with VOC RACT requirements of 25 PA Code 129.91- 129.94.

B. The records shall provide sufficient data and calculations to clearly demonstrate that the requirements of §129.91-129.94 are met.

C. Data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.

D. Records shall be retained for at least two years and shall be made available to the Department on request.

6. The operation of the aforementioned sources shall not at any time result in the emission of visible air contaminants in excess of the limitations specified in Section 123.41, particulate matter in excess of the limitations specified in Section 123.11 or sulfur oxides in excess of the limitations specified in Section 123.22, all Sections of Chapter 123 of Article III of the Rules and Regulations of the Department of Environmental Resources, or in the emission of any of these or any other type of air contaminant in excess of the limitations specified in, or established pursuant to, any other applicable rule or regulation contained in Article III.

7. The company shall not impose conditions upon or otherwise restrict the Department's access to the aforementioned source(s) and/or any associated air cleaning device(s) and shall allow the Department to have access at any time to said source(s) and associated air cleaning device(s) with such measuring and recording equipment, including equipment recording visual observations, as the Department deems necessary and proper for performing its duties and for the effective enforcement of the Air Pollution Control Act.

8. Revisions to any emission limitations incorporated in this RACT Approval will require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code §129.91(h).

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
AIR MANAGEMENT SERVICES

RACT PLAN APPROVAL

Effective Date: May 29, 1995

Amended Date: DATE

Expiration Date: None

Replaces Permit No. None

In accordance with provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and after due consideration of a Reasonably Available Control Technology (RACT) proposal received under the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, of the rules and regulations of the Pennsylvania Department of Environmental Protection (PADEP), Air Management Services (AMS) approved the RACT proposal of the Facility below for the source(s) listed in section 1.A. Emission Sources of the attached RACT Plan Approval.

Facility:	Veolia Energy Philadelphia - Edison Station
Owner:	Veolia Energy Philadelphia, Inc.
Location:	908 Sansom Street, Philadelphia, PA 19107
Mailing Address:	2600 Christian Street, Philadelphia, PA 19146
SIC Code(s):	4961
Plant ID:	04902
Facility Contact:	Jessica Hartley
Phone:	(267) 350-5819
Permit Contact:	Jessica Hartley
Phone:	(267) 350-5819
Responsible Official:	Michael J. Smedley
Title:	Vice President & General Manager

_____ _____

Edward Wiener, Chief of Source Registration Date

The RACT plan approval is subject to the following conditions:

1. The purpose of this Plan Approval is to establish Nitrogen Oxides (NOx) Reasonably Available Control Technology (RACT) for Veolia – Edison Station. This includes the following emission sources and control equipment:

A. Emission Sources

(1) Boiler #1: Riley/Stoker Corporation boiler with a capacity of 283 MMBTU/hr. The boiler is front fired and burns #6 oil as its primary fuel and #2 oil as an ignition fuel.

(2) Boiler #2: Riley/Stoker Corporation boiler with a capacity of 283 MMBTU/hr. The boiler is front fired and burns #6 oil as its primary fuel and #2 oil as an ignition fuel.

(3) Boiler #3: Babcock and Wilcox boiler with a capacity of 335 MMBTU/hr. The boiler is front fired and burns #6 oil as its primary fuel and #2 oil as an ignition fuel.

(4) Boiler #4: Babcock and Wilcox boiler with a capacity of 335 MMBTU/hr. The boiler is front fired and burns #6 oil as its primary fuel and #2 oil as an ignition fuel.

2. This approval requires and authorizes:

A. The combined quantity of #6 oil burned by Boiler #1, Boiler #2, Boiler #3 and Boiler #4 shall not exceed 65,526,316 gallons in any rolling 12-month period (This fuel limitation is removed).

B. An annual adjustment will be performed on the boilers as outlined in 25 PA Code 129.93.

3. Stack Emission Limitations

A. The maximum air contaminant em issions from these s ources, controlled by the equipment above shall be limited at stack outlet to:

(1) Nitrogen Oxides (NOx):

(a) Emissions from each of Boiler #1, Boiler #2, Boiler #3 and Boiler #4 shall not exceed 0.50 lbs/MMBTU.
(c) Emissions from each of Boiler #1 and Boiler #2 shall not exceed 185.93 tons per rolling of 12-month period.
(d) Emissions from each of Boiler #3 and Boiler #4 shall not exceed 220.1 tons per rolling of 12-month period.

4. RACT Implementation Schedule

A. Upon issuance of this approval, Veolia shall begin immediate implementation of the measures necessary to comply with the approved RACT proposal.

5. Testing Requirements and Stack Emission Limitations

A. Veolia - Edison Station must conduct annual emission performance tests on Boilers #1, #2, #3, and #4.

B. Veolia - Edison Station shall obtain approval of the test protocol prior to the test date. AMS must be notified at least 30 days prior to the actual testing in order that representatives from the agency may schedule to observe the conduct of the tests.

6. Recordkeeping and Reporting Requirements

A. Veolia - Edison Station shall maintain a file containing all the records and other data that are required to be collected to demonstrate compliance with NOx RACT requirements of 25 PA Code §129.91-129.94.; including monthly records of fuel consumption, fuel sulfur content, and NOx emissions.

B. The records shall provide sufficient data and calculations to clearly demonstrate that the requirements of 129.91-129.94 are met.

C. Data or information required to determine compliance shall be recorded monthly and maintained in a time frame consistent with the averaging period of the requirement which the 30 day rolling weighted average must be the average of the 24 hour daily weighted rate of the past 29 days and the evaluation day.. Compliance determination shall consist of the arithmetic means of results of at least three separate runs for each source test using U.S.E.P.A. Reference Methods 5 and 202, 7E, and 10. NOx emissions using annual emission performance stack test data.

D. Records shall be retained for at least two years and shall be made available to AMS on request.

7. The operation of the aforementioned sources shall not at any time result in the emission of visible air contaminants in excess of the limitations specified in Section 123.41, particulate matter in excess of the limitations specified in Section 123.11 or sulfur oxides in excess of the limitations specified in Section 123.22, all Sections of Chapter 123 of Article III of the Rules and Regulations of the Department of Environmental Resources, or in the emission of any of these or any other type of air contaminant in excess of the limitations specified in, or established pursuant to, any other applicable rule or regulation contained in Article III.

8. The company shall not impose conditions upon or otherwise restrict AMS's access to the aforementioned source(s) and/or any associated air cleaning device(s) and shall allow AMS to have access at any time to said source(s) and associated air cleaning device(s) with such measuring and recording equipment, including equipment recording visual observations, as the Department deems necessary and proper for performing its duties and for the effective enforcement of the Air Pollution Control Act.

9. Revisions to any emission limitations incorporated in this RACT Approval will require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code §129.91(h).

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
AIR MANAGEMENT SERVICES

RACT PLAN APPROVAL

Effective Date: May 29, 2995

Amended Date: DATE

Expiration Date: None

Replaces Permit No. None

In accordance with provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and after due consideration of a Reasonably Available Control Technology (RACT) proposal received under the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, of the rules and regulations of the Pennsylvania Department of Environmental Protection (PADEP), Air Management Services (AMS) approved the RACT proposal of the Facility below for the source(s) listed in section 1.A. Emission Sources of the attached RACT Plan Approval.

Facility:	Veolia Energy Philadelphia – Schuylkill Station
Permittee:	Veolia Energy Philadelphia, Inc
Location:	2600 Christian Street, Philadelphia, PA 19146
Mailing Address:	2600 Christian Street, Philadelphia, PA 19146
SIC Code(s):	4961
Plant ID:	4942
Facility Contact:	Floyd Rupple
Phone:	(267) 350-5865
Permit Contact:	Floyd Rupple
Phone:	(267) 350-5865
Responsible Official:	Michael J Smedley
Title:	VP and GM

_____ _____

Edward Wiener, Chief of Source Registration Date

The RACT plan approval is subject to the following conditions:

1. The purpose of this Plan Approval is to establish Nitrogen Oxides (NOx) Reasonably Available Control Technology (RACT) for Veolia – Schuylkill Station. This includes the following emission sources and control equipment:

A. Emission Sources

(1) Boiler #23: Combustion Engineering boiler with a capacity of 795 MMBTU/hr. The boiler is tangential fired and burns #6 oil as its primary fuel and #2 oil as an ignition fuel.

(2) Boiler #26: Babcock and Wilcox boiler with a capacity of 761 MMBTU/hr. The boiler is front wall fired and burns #6 oil.

B. **Control Equipment**

(1) Boiler #26 shall be modified with low NOx burners.

2. **This approval requires and authorizes:**

A. Boiler #26 shall be modified with low NOx burners.

B. The combined quantity of #6 oil burned by Boiler #2 and Boiler #26 shall not exceed 65,526,316 gallons in any rolling 12-month period.

3. Stack Emission Limitations

A. The maximum air contaminant emissions from these sources shall be limited at stack outlet to:

(1) Nitrogen Oxides (NOx):

(a) Boiler #23: emissions shall not exceed 0.35 lbs/MMBTU.
(b) Boiler #23: emissions shall not exceed 365.6 tons per rolling 12-month period.
(b) Boiler #26: emission rate shall not exceed 0.36 lbs/MMBTU (30-day rolling average)
(c) The combined NOx emissions from these boilers shall not exceed 1,646 tons in any rolling 12-month period (REMOVED).

4. RACT Implementation Schedule

A. Upon issuance of this approval, Veolia shall begin immediate implementation of the measures necessary to comply with the approved RACT proposal.

B. Veolia - Schuylkill Station shall begin installation of low NOx burners on Boiler #26 by May 31, 1996. Once construction has commenced, Boiler #26 shall not be operated until the installation is complete.

5. Testing and Monitoring Requirements

A. Within 90 days of start-up and final construction acceptance of low NOx burners, Veolia - Schuylkill Station must conduct initial emissions performance tests of Boiler #26 to demonstrate compliance with the emission limit above. Veolia must conduct annual emission performance tests on Boiler #23and Boiler #26.

B. Veolia - Schuylkill Station shall obtain approval of the test protocol prior to the test date. AMS must be notified at least 30 days prior to the actual testing in order that representatives from the agency may schedule to observe the conduct of the tests.

C. Continuous nitrogen oxides and oxygen monitors and recorders shall be operated on Boiler #26 in order to measure and record the concentrations of these gases emitted from the boiler outlet/stack inlet. The continuous emission

monitors must conform to USEPA performance specifications in 40 CFR Part 60, Appendix B and Pa. DER Continuous Source Monitoring Manual Rev. No. 4, July 1987.

6. Recordkeeping and Reporting Requirements

A. Compliance shall be monitored and recorded based on annual NOx stack tests for each boiler and NOx CEMS for Boiler#26. The facility shall monitor and record compliance with them based on daily hours of operation, fuel type, fuel usage, fuel sulfur contentfor each boiler, and NOX CEMs for boiler #26 and annual stack test for Boiler #23 compliance with them based on fuel usage and the annual NOx stack tests.

B. Veolia - Schuylkill Station shall maintain a file containing all the records and other data that are required to be collected to demonstrate compliance with NOx RACT requirements of 25 PA Code §129.91-129.94. These records shall include fuel consumption, fuel sulfur content, and NOx emissions.

C. The records shall provide sufficient data and calculations to clearly demonstrate that the requirements of §129.91-129.94 are met.

D. Data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.

E. Records shall be retained for at least two years and shall be made available to AMS on request.

7. The operation of the aforementioned sources shall not at any time result in the emission of visible air contaminants in excess of the limitations specified in Section 123.41, particulate matter in excess of the limitations specified in Section 123.11 or sulfur oxides in excess of the limitations specified in Section 123.22, all Sections of Chapter 123 of Article III of the Rules and Regulations of the Department of Environmental Resources, or in the emission of any of these or any other type of air contaminant in excess of the limitations specified in, or established pursuant to, any other applicable rule or regulation contained in Article III.

8. The company shall not impose conditions upon or otherwise restrict AMS's access to the aforementioned source(s) and/or any associated air cleaning device(s) and shall allow AMS to have access at any time to said source(s) and associated air cleaning device(s) with such measuring and recording equipment, including equipment recording visual observations, as AMS deems necessary and proper for performing its duties and for the effective enforcement of the Air Pollution Control Act.

9. Revisions to any emission limitations incorporated in this RACT Approval will require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code §129.91(h).

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
AIR MANAGEMENT SERVICES
DRAFT RACT PLAN APPROVAL

Effective Date: XXXX

Amended Date: XXXX

Expiration Date: None

Replaces Permit No.None

In accordance with provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and after due consideration of a Reasonably Available Control Technology (RACT) proposal received under the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, of the rules and regulations of the Pennsylvania Department of Environmental Protection (PADEP), Air Management Services (AMS) approved the RACT proposal of the Facility below for the source(s) listed in section 1.A. Emission Sources of the attached RACT Plan Approval.

Facility:	Temple University – Main Campus
Owner:	Temple University
Location:	Broad Street and Montgomery Avenue, Philadelphia, PA 19122
Mailing Address:	1009 West Montgomery Ave, Philadelphia, PA 19122
SIC Code(s):	8221
Plant ID:	08905
Facility Contact:	Kurt A. Bresser
Phone:	(215) 204-4515
Permit Contact:	Kurt A. Bresser
Phone:	(215) 204-4515
Responsible Official:	Robert Siegfried
Title:	Associate Vice President, Facilities Management

Edward Wiener, Chief of Source Registration Date

The RACT plan approval is subject to the following conditions:

1) The purpose of this plan approval is to establish Nitrogen oxide and (NOx) Reasonably available control technology (RACT) for Temple University, Main Campus. This includes the following emission source and control equipment.

A. Emission Sources

(i) BMCEP Boiler #1: Victory Energy Models VS-4-68, a natural gas heat input rating of 91.3 MMBTU/Hr and a #2 fuel oil heat input rating of 86.8 MMBTU/Hr.

(ii) BMCEP Boiler #2: Victory Energy Models VS-4-68, a natural gas heat input rating of 91.3 MMBTU/Hr and a #2 fuel oil heat input rating of 86.8 MMBTU/Hr.

(iii) BMCEP Boiler #3: Victory Energy Models VS-4-68, a natural gas heat input rating of 91.3 MMBTU/Hr and a #2 fuel oil heat input rating of 86.8 MMBTU/Hr.

(iv) Ten (10) Standby Generators, Caterpillar 3516 Tandem engine, 2250 Hp each, burning natural gas.

2) Control equipment

(i) Each boiler shall be installed with low NOx burners and flue gas recirculation**.**

3) **Emission limits**

A. Boilers

(i) Nitrogen Oxides (NO_x) emissions from the three boilers combined shall not exceed 15.5 tons per rolling twelve month period.

(ii) Emissions from each boiler shall not exceed the following: [25 Pa Code §127.1]

(a) NOx: 0.036 lbs/MMBTU for while burning natural gas, and

(b) 0.110 lbs/MMBTU for while burning No.2 oil.

B. Standby Electric Generators

(i) NOx emission from each standby electric generator shall be less than or equal to 2.00 g/bhp-hr;

(ii) Each Standby Electric Generator shall operate at a maximum of 500 hours per rolling 12-month period

(iii) The Combined NOx hourly emission rate shall be less than or equal to 99 lb/hr

4) Work practice standard

A. Standby Electric Generators

(i) Each Standby Electric Generating Facility shall operate at a maximum of 500 hours per rolling 12-month period

5) Testing Requirements

A. Boilers

(i) The Permittee shall perform stack testing on BMCEP Boilers 1-3 when requested by AMS.

B. Standby Electric generators

(i) Temple Main shall conduct quarterly NOx portable analyzer test on each engine using AMS-approved procedure.

6) <u>Monitoring, Recordkeeping and Reporting Requirements</u>

A. Temple shall monitor and record the following
   (i) The combined boiler NOx emission per rolling 12-month period calculated monthly to demonstrate compliance with the above NOx emission limits.
   (ii) Operating hours for each Standby Electric Generator per rolling twelve month period calculated monthly
   (iii)Portable analyzer test results for each engine
B. Temple University shall maintain a file containing all the records and data that are required to be collected to demonstrate compliance with NOx RACT requirement of 25 PA Code §129.91-129.94
C. Records shall be retained for at least five years and shall be made available to AMS on request.
D. The company shall not impose conditions upon or otherwise restrict AMS's access to the aforementioned source(s) and/or any associated air cleaning device(s) and shall allow AMS to have access at any time to said source(s) and associated air cleaning device(s) with such measuring and recording equipment, including equipment recording visual observations, as the Department deems necessary and proper for performing its duties and for the effective enforcement of the Air Pollution Control Act.
E. Revisions to any emission limitations incorporated in this RACT Approval will require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code §129.91(h)

7) RACT Implementation Schedule

A. Upon issuance of this approval Temple University – Main Campus shall begin immediate implementation of the measures necessary to comply with the approved RACT proposal.

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
AIR MANAGEMENT SERVICES

RACT PLAN APPROVAL

Effective Date: Date

Amended Date: DATE

Expiration Date: None

Replaces Permit No. None

In accordance with provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and after due consideration of a Reasonably Available Control Technology (RACT) proposal received under the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, of the rules and regulations of the Pennsylvania Department of Environmental Protection (PADEP), Air Management Services (AMS) approved the RACT proposal of the Facility below for the source(s) listed in section 1.A. Emission Sources of the attached RACT Plan Approval.

Facility:	Grays Ferry Cogeneration Partnership – Schuylkill Station
Permittee:	Grays Ferry Cogeneration Partnership
Location:	2600 Christian Street, Philadelphia, PA 19146
Mailing Address:	2600 Christian Street, Philadelphia, PA 19146
SIC Code(s):	4961
Plant ID:	4944
Facility Contact	Floyd Rupple
Phone:	(267) 350-5846
Permit Contact:	Floyd Rupple
Phone:	(267) 350-5846
Responsible Official:	Michael J. Smedley
Title:	Vice President and General Manager

Edward Wiener, Chief of Source Registration Date

The RACT plan approval is subject to the following conditions:

1. The purpose of this Plan Approval is to establish Nitrogen Oxides (NOx) Reasonably Available Control Technology (RACT) for Veolia – Schuylkill Station. This includes the following emission sources and control equipment:

A. Emission Sources

(1) Boiler #25: Auxilary boiler with a capacity of 1119 MMBTU/hr. The boiler is front wall fired burns #2 oil and Natural Gas.

(2) Turbine (with and without HRSG): Combustion Turbine (CT) is a combined cycle turbine with a capacity of 1515 MMBTU/hr (135 MW). The CT burns #2 oil and Natural Gas.

B. **Control Equipment**

(1) Boiler #25 shall be modified with low NOx (LNB) burners and flue gas recirculation (FGR).
(2) CT has SCR and in addition of low NOx (DLN) combustion for gas firing, and water injection (WI) for oil firing.

2. **This approval requires and authorizes:**

A. Boiler #25 shall be modified with low NOx burners and flue gas recirculation .

B. CT shall be modified with SCR and in addition of low NOx (DLN) combustion for gas firing, and water injection for oil firing.

3. Stack Emission Limitations

A. The maximum air contaminant emissions from these sources shall be limited at stack outlet to:

(1) Nitrogen Oxides (NOx):

(a) Boiler #25- NOx emissions shall not exceed 0.10 pounds per MMBTU when firing gas and 0.15 pounds per MMBTU when firing oil. The emission for boiler #25 is 490 tons per year when burning gas and 735 tons per year when burning #2 oil.

(b) The Combustion Turbine has a NOx emission should not exceed 0.0344 pounds per MMBTU (9 ppm) when firing gas and 0.168 pounds per MMBTU (42 ppm) when firing oil. The CT NOx limits exclude startup and shutdown.

(c) The facility shall monitor and record compliance based on NOX CEMs for Boiler #25 and CT.

4. RACT Implementation Schedule

A. Upon issuance of this approval, Grays Ferry shall begin immediate implementation of the measures necessary to comply with the approved RACT proposal.

(3) Grays Ferry shall begin installation of low NOx burners and flue gas recirculation on Boiler #25, and SCR and in addition of low NOx (DLN) combustion for gas firing, and water injection for oil firing on CT.

B. Once construction has commenced, Boiler #25 and CT shall not be operated until the installation is complete.

5. Testing and Monitoring Requirements

A. Within 90 days of start-up and final construction acceptance of low NOx burners and FGR, Grays Ferry must conduct initial emissions performance tests of Boiler #25 and CT to demonstrate compliance with the emission limit above. Grays Ferry must conduct annual emission performance tests on Boiler #25and CT.

B. Grays Ferry shall obtain approval of the test protocol prior to the test date. AMS must be notified at least 30 days prior to the actual testing in order that representatives from the agency may schedule to observe the conduct of the tests.

C. Continuous nitrogen oxides and oxygen monitors and recorders shall be operated on Boiler #25 and CT in order to measure and record the concentrations of these gases emitted from the boiler and CT outlet/stack inlet. The continuous emission monitors must conform to USEPA performance specifications in 40 CFR Part 60, Appendix B and Pa. DER Continuous Source Monitoring Manual Rev. No. 4, July 1987.

6. Recordkeeping and Reporting Requirements

A. Compliance shall be monitored and recorded based on NOx CEMS for Boiler#25 and CT. The facility shall monitor and record compliance with them based on daily hours of operation, fuel type, fuel usage, fuel sulfur contentfor each boiler, and NOX CEMs for boiler #25 and CT.

B. Grays Ferry shall maintain a file containing all the records and other data that are required to be collected to demonstrate compliance with NOx RACT requirements of 25 PA Code §129.91-129.94. These records shall include fuel consumption, fuel sulfur content, and NOx emissions.

C. The records shall provide sufficient data and calculations to clearly demonstrate that the requirements of §129.91-129.94 are met.

D. Data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.

E. Records shall be retained for at least two years and shall be made available to AMS on request.

7. The operation of the aforementioned sources shall not at any time result in the emission of visible air contaminants in excess of the limitations specified in Section 123.41, particulate matter in excess of the limitations specified in Section 123.11 or sulfur oxides in excess of the limitations specified in Section 123.22, all Sections of Chapter 123 of Article III of the Rules and Regulations of the Department of Environmental Resources, or in the emission of any of these or any other type of air contaminant in excess of the limitations specified in, or established pursuant to, any other applicable rule or regulation contained in Article III.

8. The company shall not impose conditions upon or otherwise restrict AMS's access to the aforementioned source(s) and/or any associated air cleaning device(s) and shall allow AMS to have access at any time to said source(s) and associated air cleaning device(s) with such measuring and recording equipment, including equipment recording visual observations, as AMS deems necessary and proper for performing its duties and for the effective enforcement of the Air Pollution Control Act.

9. Revisions to any emission limitations incorporated in this RACT Approval will require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code §129.91(h).

CITY OF PHILADELPHIA
DEPARTMENT OF PUBLIC HEALTH
AIR MANAGEMENT SERVICES

RACT PLAN APPROVAL

Effective Date: DATE

Amended Date: DATE

Expiration Date: None

Replaces Permit No. None

In accordance with provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and after due consideration of a Reasonably Available Control Technology (RACT) proposal received under the Pennsylvania Code, Title 25, Chapter 129.91 thru 129.95, of the rules and regulations of the Pennsylvania Department of Environmental Protection (PADEP), Air Management Services (AMS) approved the RACT proposal of the Facility below for the source(s) listed in section 1.A. Emission Sources of the attached RACT Plan Approval.

Facility:	Veolia Energy Efficiency
Permittee:	Veolia Energy Philadelphia, Inc
Location:	2600 Christian Street, Philadelphia, PA 19146
Mailing Address:	2600 Christian Street, Philadelphia, PA 19146
SIC Code(s):	4961
Plant ID:	10459
Facility Contact:	Jessica Hartley
Phone:	(267) 350-5865
Permit Contact:	Floyd Rupple
Phone:	(267) 350-5819
Responsible Official:	Michael J Smedley
Title:	VP and GM

_____ _____

Edward Wiener, Chief of Source Registration Date

The RACT plan approval is subject to the following conditions:

1. The purpose of this Plan Approval is to establish Nitrogen Oxides (NOx) Reasonably Available Control Technology (RACT) for Veolia Energy Efficiency LLC. This includes the following emission sources and control equipment:

A. Emission Sources

(1) Boiler #1: Steam boiler with a capacity of 297.91 MMBTU/hr. The boiler fired and burns #2 oil and Natural Gas.

(2) Boiler #2: Steam boiler with a capacity of 297.91 MMBTU/hr. The boiler fired and burns #2 oil and Natural Gas.

B. **Control Equipment**

(1) Boiler #1 and #2 shall be modified with ultra low NOx burners.

2. **This approval requires and authorizes:**

A. Boiler #1 and #2 shall be modified with ultra low NOx burners.

B. The combined quantity of fuel oil burned by Boiler #1 and Boiler #2 shall not exceed 5,350,000 gallons in any rolling 12-month period.

3. Stack Emission Limitations

A. The maximum air contaminant emissions from these sources shall be limited at stack outlet to:

(1) Nitrogen Oxides (NOx):

Nitrogen Oxide (NO_x) emission from each boiler shall not exceed the following:

(a) Natural Gas 0.01 lb/MMBTU heat input 30-day rolling average (9 ppm @ 3% O2)
No. 2 fuel oil0.08 lb/MMBTU heat input 30-day rolling average (62 ppm @ 3% O2)

(b) During startup, shutdown, or malfunction NOx emissions from each boiler shall not exceed:
Natural Gas 0.036 lb/MMBTU heat input (30 ppm @ 3% O2)
No. 2 fuel oil0.08 lb/MMBTU heat input (62 ppm @ 3% O2)

(c) Startup shall be defined as that period of time from initiation of the boiler operation until the unit reaches steady state. Shutdown shall be defined as the cessation of the boiler operation. Each period shall not exceed 30 minutes.

(d) Nitrogen Oxides (NO_x) emissions from both boilers combined shall not exceed 52.31 tons per year, calculated on a 12-month rolling period.

4. RACT Implementation Schedule

A. Upon issuance of this approval, Veolia Energy Efficiency shall begin immediate implementation of the measures necessary to comply with the approved RACT proposal.

B. Veolia Energy Efficiency shall begin installation of ultra low NOx burners on each Boiler immediatly.

5. Testing and Monitoring Requirements

A. Within 90 days of start-up and final construction acceptance of ultra low NOx burners, Veolia Energy Efficiency must conduct initial emissions performance tests of each Boiler to demonstrate compliance with the emission limit above.

B. Veolia Energy Efficiency shall obtain approval of the test protocol prior to the test date. AMS must be notified at least 30 days prior to the actual testing in order that representatives from the agency may schedule to observe the conduct of the tests.

C. Continuous nitrogen oxides and oxygen monitors and recorders shall be operated on each Boiler in order to measure and record the concentrations of these gases emitted from the boiler outlet/stack inlet. The continuous emission monitors must conform to USEPA performance specifications in 40 CFR Part 60, Appendix B and Pa. DER Continuous Source Monitoring Manual Rev. No. 4, July 1987.

6. Recordkeeping and Reporting Requirements

A. Compliance with the NOx emission limits shall be monitored and recorded based on NOx CEM data and AMS-approved stack test data.

B. The facility shall monitor and record compliance with them based on daily hours of operation, fuel type, fuel usage, fuel sulfur contentfor each boiler, and NOX CEMs for each boiler.

C. Veolia Energy Efficiency shall maintain a file containing all the records and other data that are required to be collected to demonstrate compliance with NOx RACT requirements of 25 PA Code §129.91-129.94. These records shall include fuel consumption, fuel sulfur content, and NOx emissions.

D. The records shall provide sufficient data and calculations to clearly demonstrate that the requirements of §129.91-129.94 are met.

E. Data or information required to determine compliance shall be recorded and maintained in a time frame consistent with the averaging period of the requirement.

F. Records shall be retained for at least two years and shall be made available to AMS on request.

7. The operation of the aforementioned sources shall not at any time result in the emission of visible air contaminants in excess of the limitations specified in Section 123.41, particulate matter in excess of the limitations specified in Section 123.11 or sulfur oxides in excess of the limitations specified in Section 123.22, all Sections of Chapter 123 of Article III of the Rules and Regulations of the Department of Environmental Resources, or in the emission of any of these or any other type of air contaminant in excess of the limitations specified in, or established pursuant to, any other applicable rule or regulation contained in Article III.

8. The company shall not impose conditions upon or otherwise restrict AMS's access to the aforementioned source(s) and/or any associated air cleaning device(s) and shall allow AMS to have access at any time to said source(s) and associated air cleaning device(s) with such measuring and recording equipment, including equipment recording visual observations, as AMS deems necessary and proper for performing its duties and for the effective enforcement of the Air Pollution Control Act.

9. Revisions to any emission limitations incorporated in this RACT Approval will require resubmission as revision to the PA State Implementation Plan. The applicant shall bear the cost of public hearing and notification required for EPA approval as stipulated in 25 PA Code §129.91(h).

Public Hearing Notice

PUBLIC NOTICE

PHILADELPHIA AIR MANAGEMENT SERVICES

PROPOSED REVISION TO THE STATE IMPLEMENTATION PLAN TO MEET THE REQUIREMENTS OF REASONABLY AVAILABLE CONTROL TECHNOLOGY SET FORTH BY THE CLEAN AIR ACT UNDER THE 1997 8-HOUR NAAQS

The Clean Air Act Amendments of 1990 (CAA) requires Philadelphia County (Philadelphia) to submit to the U.S. Environmental Protection Agency (EPA) a State Implementation Plan (SIP) revision demonstrating that Philadelphia has implemented all necessary Reasonably Available Control Technology (RACT) controls on all major stationary sources of volatile organic compounds (VOC) and oxides of nitrogen (NOx).

The Philadelphia Department of Public Health, Air Management Services (AMS) is now seeking public comment on a proposed SIP revision that updates Philadelphia's RACT demonstration for the 1997 8-hour ozone National Ambient Air Quality Standards (NAAQS).

On December 13, 2013 (78 FR 75902), EPA conditionally approved Philadelphia's 1997 8-hour ozone RACT demonstration provided in the 2006 and 2010 SIP revisions, based upon a commitment from AMS to submit additional SIP revisions to provide source-specific RACT determinations for certain major sources of VOC and NOx in Philadelphia and a certification that previously adopted source-specific RACT controls approved by EPA in the Pennsylvania's SIP under the 1-hour ozone NAAQS for the remaining sources in Philadelphia County (as listed in 40 CFR 52.2020(d)(1)) continue to adequately represent RACT for the 1997 8-hour ozone NAAQS.

This SIP revision is intended to partially satisfy AMS' commitment by addressing source-specific RACT determinations for certain major sources of VOC and/or NOx; certifying that previously adopted source-specific RACT controls approved by EPA in the Pennsylvania's SIP under the 1-hour ozone NAAQS continue to adequately represent RACT for the 1997 8-hour ozone NAAQS; and certifying that certain sources that were applicable to the 1-hour ozone RACT are now minor sources or have shut down and are no longer applicable to the 1997 8-hour ozone RACT.

This SIP revision also includes revisions to the approved RACT plan approvals for the following facilities:

Honeywell, formerly Sunoco Chemicals (4700 Bermuda Street)

Kinder Morgan, previously GATX (3300 North Delaware Ave.)

PaperWorks, formerly Jefferson Smurfit (5000 Flat Rock Road)

Temple – Health Sciences (3401 N. Broad Street)

PES Refinery, formerly Sunoco Refinery (3144 Passyunk Ave.)

Philadelphia Gas Works – Richmond (3100 East Venango Street)

Cardone Industries (5660 Rising Sun Ave.)

Veolia Energy Philadelphia – Edison Station, formerly Trigen - Edision (908 Sansom Street)

Veolia Energy – Schuylkill Station, formerly Trigen - Schuylkill (2600 Christian Street

This SIP revision also includes the following facilities which were not part of the 1-hour ozone RACT:

Temple University – Main Campus (Broad Street and Montgomery Ave.)

Grays Ferry Cogeneration Partnership (2600 Christian Street)

Veolia Energy Efficiency (2600 Christian Street)

This SIP revision also includes a certification that 25 PA Code 129.81 which was originally approved as RACT for the 1-hour ozone standard continues to represent RACT for the 8-hour ozone standard.

The SIP revision and other supporting information are available for inspection at the offices of AMS during normal business hours or on AMS' website at http://www.phila.gov/health/AirManagement/PublicMeetings.html.

Anyone affected by the proposed updates to the SIP revision may submit written comments or a request for a public hearing by mail to Air Management Services, 321 University Avenue, 2nd Floor, Philadelphia, PA 19104, Attn: Karen Smith within thirty (30) days from today. If requested, AMS will hold a public hearing to accept additional public comments on **October 22, 2014**, **at 6 PM** at the Spellman Building, 321 University Avenue, 1st Floor Conference Room, Philadelphia, PA 19104. Persons with a disability who desire to attend the meeting and require an auxiliary aid, service, or other accommodation to participate in the proceedings should contact Alison Riley at (215) 685-9422 to discuss how AMS may accommodate their needs.

If no request for public hearing is received by **4 PM on October 20, 2014**, the hearing will be cancelled and notice of the cancellation will be published on **October 21, 2014**, on AMS' website http://www.phila.gov/health/AirManagement/PublicMeetings.html. Interested parties may also call (215) 685-7572 to find out if the hearing has been cancelled.