Title V Air Operation Permit Renewal
Permit No. 0330040-037-AV

APPLICANT

The applicant for this project is Ascend Performance Materials Operations LLC. The applicant's responsible official and mailing address are: Timothy N. Montgomery, Chemical & Utilities Plant Manager, Ascend Performance Materials Operations LLC, Post Office Box 97, Gonzalez, Florida 32560-0097.

FACILITY DESCRIPTION

The applicant operates the Pensacola Plant, which is located at 3000 Old Chemstrand Road in Cantonment, Escambia County.

Ascend manufactures various intermediate chemicals and products, including adipic acid, nylon fibers, nylon resins, hexamethylene diamine, and maleic anhydride. This facility consists of several raw materials barge, train and truck offloading and storage operations; chemical unit process plants that make the chemical feedstocks and intermediates and the nylon resins; a yarn plant to make finished yarn product; and, boilers and a cogeneration unit to provide process steam and plant electricity. Ascend operates a maleic anhydride facility, not part of the nylon process, which is owned by Huntsman Petrochemical Corporation.

The following is a brief description of the emissions units:

Boilers Nos. 4, 5 and 6 are manufactured by Combustion Engineering and rated at 241 MMBtu/hour heat input. These boilers are normally fueled by natural gas and ethane rich natural gas. No. 6 fuel oil is an alternate fuel, which may contain blended on-specification used oil as supplemental fuel. The used oil must meet the requirements of 40 CFR 279 (Standards for the Management of Used Oil). Boilers 4 and/or 5 may also burn as supplemental fuels AGS (a mixture of organic acids from deep well waste stream), KATT (a mixture of organic esters), DME (Dimethyl Esters), Amines and Area 480 residue. Emissions are controlled by proper combustion control and by fuel composition. These emissions units are regulated under Rules 62-296.405(1)(c)1.f (SO_2 aggregate limitation) and 62-296.406, F.A.C. (Fossil Fuel Steam Generators with less than 250 MMBtu heat input).

Boilers Nos. 7 and 8 were modified to incorporate low NOx burners and are fueled by natural gas, ethane rich natural gas, maleic anhydride production off gas, and pentane vapor stream. Each of the modified burners is rated for 388 MMBtu/hour and 225,000 pounds/hour steam production. Emissions are controlled by proper combustion controls. SO_2 emissions are controlled by sulfur content of fuel. These emissions units are regulated under Rule 62-296.405, F.A.C., Fossil Fuel Steam Generators with more than 250 MMBtu heat input; however, the emission limitations have been adjusted as a result of emission offsets associated with the facility's cogeneration plant.

Boiler No. 9 is a natural gas fired boiler with a maximum rated heat input of 344 MMBtu per hour and 250,000 pounds per hour steam and operates without an SCR unit. The packaged boiler is manufactured by Indeck Power Equipment Company/Volcano Technologies, Inc., Model No. A5-250-S. This boiler is subject to 40 CFR 60 subpart Db. NOx emissions are controlled with low NOx burners and flue gas recirculation. Permittee has a maximum annual fuel limitation of 1,845,732 thousand standard cubic feet per 12-month rolling period (MSCF/yr) of natural gas. The heat input shall not exceed 219.1 MMBtu/hr (monthly basis) which is 63.7 % of the maximum heat input of 344 MMBtu/hr. The boiler is restricted to 63.7% of capacity until an SCR is added.

Maleic Anhydride (MA) Plant operates with a design capacity of 260 million pounds per year of maleic anhydride. The reaction is carried out in four reactors using butane as a raw material with off gases separated in two product recovery units and combusted in Boiler Nos. 7 and 8. Approximately 6.5 million standard cubic feet per hour of off gas is emitted from each pair of reactors, which contains approximately 9,000 pounds per hour of CO and 7,000 pounds per hour of VOC at design rates. The balance of the off gas stream is H_2O, CO_2, N_2 and O_2.

Emissions of CO and VOC are controlled by burning in Boilers Nos. 7 and 8. The two off gas headers are cross connected, but normal flow is from Reactors 1 and 2 to Boiler No. 7 and from Reactors 3 and 4 to Boiler No. 8. During startup, shutdown or malfunction of the Maleic Anhydride (MA) Plant, waste gases are vented without control for safety reasons. Such venting is conditionally allowed. This emissions unit is regulated under applicable portions of 40 CFR 60 Subparts A (General Provisions), VV (Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry), and Subpart III (Standards of Performance for VOC Emissions From the Synthetic Organic Chemical Manufacturing Industry Air Oxidation Unit Processes); 40 CFR 63 Subparts A (General Provisions), Subpart F (National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry), Subpart G (National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater) and Subpart H (National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks). Permittee shall also comply with all the applicable standards and requirements of 40 CFR 63 Subpart FFFF (Miscellaneous Organic Manufacturing).

Cogeneration Plant consists of one combustion turbine that exhausts through a heat recovery steam generator with duct burner. The heat recovery steam generator supplies steam to the manufacturing operations and replaces steam generated by the existing boilers. The turbine, fueled by natural gas as defined in 40 CFR 60.331(u), turns a generator capable of producing a nominal 86 megawatts of electricity. Supplemental firing of natural gas at the heat recovery steam generator supplies additional steam, if needed. The combustion turbine employs steam injection to control NO_x emissions. The duct burner is equipped with a low NO_x burner. Operation of the combustion turbine using evaporative direct water spray fogging inlet air cooling is also authorized. This emissions unit is regulated under applicable portions of 40 CFR 60 Subpart A (General Provisions), Subpart Db (Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units) and Subpart GG (Standards of Performance for Stationary Gas Turbines), and 40 CFR 64, Compliance Assurance Monitoring for NO_x.

Adipic Acid Drying uses steam as the heat supply. Particulate emissions are controlled by bag filters and/or scrubbers. These emissions units are regulated under Rule 62-296.320, F.A.C., for PM and Rule 62-297.620(4), F.A.C., which waives a PM stack test if VE tests are less than an alternate standard of 5% opacity.

Adipic Acid Process oxidizes a ketone and alcohol mixture (KA, cyclohexanone/cyclohexanol) with nitric acid to produce an Adipic Acid solution. The solution is refined by chilling due to vacuum evaporation, forming Adipic Acid crystals at the bottom of the process vessel. The resulting slurry is centrifuged to remove water and form a wet cake. The wet cake is re-dissolved in pure water and the purified Adipic Acid solution is sent to the Nylon Salt Strike or Drying and Product Loading operations. Emissions of CO, VOC and NO_x are controlled by sending them to the TRU/SCR I or the SCR II. The SCR II, a backup control device, controls only NOx when the TRU/SCR I is out of service. Both the primary and the backup control devices are equipped with continuous emissions monitoring systems (CEMS). Heat recovered from the TRU/SCR I vent stream is used to produce 650 psig steam in a heat recovery boiler. This emissions unit is regulated under applicable portions of 40 CFR 60 Subparts A (General Provisions), Subpart VV (Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry), Subpart NNN (Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry), and Rule 212.400(5), F.A.C., Prevention of Significant Deterioration (PSD).

Eight Vaporizers with a total capacity of 136 million Btu/hour heat input produce Therminol vapor which supplies heat to the nylon production process. There are no individual Vaporizer limits beyond this total limit. These emissions units are primarily fueled by natural gas. Except for vaporizer No. 8, Number 2 fuel oil with a maximum of 0.5 % sulfur by weight is allowed as an emergency fuel. Vaporizers 1-7 predate the NSPS. Vaporizer No. 8 is regulated under applicable portions of 40 CFR 60 Subparts A and Dc, adopted and incorporated by reference in Rule 62-204.800, F.A.C. Because vaporizer No. 8 will combust only natural gas

with no fuel oil for emergency backup, it is subject only to the notification and fuel recordkeeping requirements in 40 CFR 60.48c. Energy conservation features, which do not effect emissions, have been incorporated into the Vaporizer facility. Vaporizer unit exhausts have been consolidated in some cases. The facility is still capable of exhausting through individual stacks, if necessary.

Nylon Polymerization Lines: Hexamethylene diamine is reacted with adipic acid to form hexamethylene diammonium adipate, or nylon salt. The salt is heated and water is evaporated to form nylon 6,6 polymer by both continuous and batch processes. The molten polymer is solidified to nylon fiber from the continuous lines and to flake products from the batch lines. Unconfined emissions of organic compounds occur during this solidification and are vented away from the working areas and discharged without controls. VOC generated during evaporation and reaction steps are controlled using a distillation column. VOC generated during the finishing and spinning step (monomer) is either vented away from the work area and discharged without controls or controlled using water scrubbers. Particulate matter is also generated in this process either as a result of flake handling or condensation of uncontrolled monomer. Heat recovery is used to produce steam. Continuous nylon polymerization lines (CP) 24, 25, 26, 27, 28 and 29 are six of 12 existing CP lines that have converted the finished product processing (spinning or pelletizer) from nylon fiber to a flake (pellet) product. Unconfined emissions of organic compounds occur during the solidification and are vented away from the working areas and discharged without controls. The 12 continuous polymerization lines normally operate using an Evaporator/Reactor/Finisher process design or an alternative polymerization method, involving an Evaporator/Pre-reactor/Reactor/Finisher process design. Each continuous line has a separate evaporator. A portion of evaporator emissions is used to preheat the nylon salts, and the remaining emissions are normally fed to a distillation column shared by other yarn plant equipment. Pre-reactor steam and emissions are also fed to the distillation column control device. Reactor steam is condensed to produce process steam and the condensate is handled as wastewater. Monomer scrubbers control the emissions from the Finishing step. Four batch evaporators cyclically feed the batch lines' 12 autoclaves where the batch polymerization takes place. The autoclave emissions are also normally fed to the distillation column. The organics recovered by the distillation column are used as supplemental fuel in power boilers or routed to the plant process waste disposal system. The modifications to CP lines 24, 25, 26 and 27 increased volatile organic compounds (VOC) and particulate matter (PM) emissions, with the increase in VOCs being covered by permit no. 0330040-017-AC, issued April 19, 2005. PM emissions increased a total of 1.53 tons per year emitted uncontrolled. The flow rates from permit 0330040-025-AC (CP 28 and 29 conversion to pelletizing), using an estimated 0.003 grains per scf results in a total PM emissions increase of 1.45 tons per year uncontrolled. VOC emissions from nylon polymerization for EU Nos. 081 and 082 are controlled by Distillation Column. The VOC emissions limitation of 715 pounds per day, as a rolling annual average, contained in Specific Condition H.2 of Title V permit no. 0330040-002-AV, remains unchanged.

Cyclohexane Oxidation Process: Ascend produces cyclohexanone/cyclohexanol, a ketone and alcohol mixture, as an intermediate chemical in the production of adipic acid. Cyclohexane is oxidized with air in two high-pressure reactor trains. Emissions are primarily VOC and CO. Two high-pressure scrubbers recover the cyclohexane from the reactor off gas. Further VOC and CO emissions reductions are effected by routing the emissions from the high-pressure scrubbers to a NOx thermal reduction unit (TRU) when operating. The reactors are discharged to cyclohexane recovery, product refining, and distillation operations. Emissions from these operations are controlled by two low-pressure scrubbers, which vent to the atmosphere. The emissions from the low-pressure scrubbers are of similar composition but lesser quantity than those from high-pressure scrubbers. Total process emissions from all scrubbers of volatile organic compounds are estimated at 926 pounds per hour and emissions of carbon monoxide are estimated at 1,404 pounds per hour. The emissions of VOC and CO are normally controlled in a TRU identified as part of EU I.D. No. 002 (Adipic Acid Plant) in the facility's Title V permit. When the TRU is down or during other process upsets, the VOC and CO emissions are vented into the atmosphere. A thermal oxidizer, the Organic BackUp Device, or OBUD, is used as a backup device to control the VOC and CO emissions from the Halcon process area during times when the TRU is down or during other process upset conditions. The thermal oxidizer system is designed for 99% destruction of VOC and 98% destruction of CO. The oxidizer has a primary mixing chamber and two nozzle mix burners. The natural gas burners supplement the heat provided in the

waste gas stream, and provide mixing and turbulence. The oxidizer operates between 1,300 - 1,500°F, depending upon exact flow conditions, with a minimum of a 1-second dwell time to maximize VOC destruction. Exhaust gases from the oxidizer are discharged through a stub stack to the atmosphere. The thermal oxidizer is subject to incinerator requirements of Rule 62-296.401(1), F.A.C. The Cyclohexane Oxidation Process has a cyclohexanone/cyclohexanol (KA) Recovery Column which functions as a separator for product KA, water and impurities. The overhead vapors pass through an overhead condenser into a decanter where the aqueous and hydrocarbon streams are separated. The aqueous phase is further processed for recovery. The hydrocarbon stream is routed to product streams for refining. The vapors from condenser and decanter are mixed with other streams to feed one of the low-pressure scrubbers. The condenser system operates with the sump temperature below 50°C. The condenser sump temperature is monitored and recorded. This emissions unit is subject to the following regulations: 40 CFR 60 Subpart A (General Provisions); Subpart NNN (Standards of Performance for Volatile Organic Compound (VOC) Emissions from Synthetic Organic Chemical Manufacturing Industry); 40 CFR 61 Subpart FF (National Emission Standard for Benzene Waste Operations); 40 CFR 64, Compliance Assurance Monitoring (CAM), for CO and VOC; and Rule 62-296.401(1), F.A.C.

Hydrogen Generating Plant: Hydrogen is used in the production of hexamethylene diamine and other nylon intermediates chemicals. A feedstock of natural gas or ethane-rich gas is de-sulfurized. The gas then is heated in the reformer fueled by natural gas and waste process gas. The combustion flue gases of the reformer are the only source of emissions. Particulate emissions are controlled by proper combustion and nitrogen oxides are controlled by use of low NO_x burners. This emissions unit is regulated under Chapter 62-213 as an EPA major source of air pollution and by Rule 62-296.320(4)(b), F.A.C., for visible emissions.

Hexamethylene Diamine Synthesis:
Adiponitrile is hydrogenated to yield crude Hexamethylene Diamine (HMD). The HMD then is refined by vacuum distillation. A vacuum is achieved by staged steam jets. The water soluble HMD is discharged in the steam condensate to the wastewater system. The concentration of HMD in the non-condensable emissions is reduced in each stage. The stripper distillation columns are subject to applicable requirements of 40 CFR 60, Subpart A (General Provisions) and Subpart NNN (Standards of Performance for Volatile Organic Compound (VOC) Emissions from Synthetic Organic Chemical Manufacturing Industry). 40 CFR 60.662(c) allows a facility to maintain a total resource effectiveness (TRE) index greater than 1.0 without the use of VOC emission control devices. Column head pressures are used as a surrogate parameter to maintain TRE index.

Nitric Acid Plant operates with a maximum capacity of 1500 tons per day. NOx emissions are controlled by process operating conditions and/or use of a Selective Catalytic Reduction (SCR) NOx abatement device. In the synthesis process, ammonia is oxidized in the presence of a catalyst to form NOx, which then is converted to nitric acid by a reaction with water. Startup, shutdown and malfunction allowance is 3 hours based on 40 CFR 60 Subpart G. This emissions unit is regulated under applicable portions of 40 CFR 60 Subpart A (General Provisions) and Subpart G (Standards of Performance for Nitric Acid Plants).

Area 480 KA reacts phenol with hydrogen in a gas phase hydrogenation reaction for conversion to cyclohexanone/cyclohexanol mixture (KA). The KA is used in adipic acid production. Process emissions are primarily VOC. Fugitive emissions are VOC, primarily cyclohexanone and cyclohexanol; and HAP, primarily phenol. The VOC emission control equipment for the Area 480 process consists of an enclosed Flare and an enclosed Backup Flare. This emissions unit is regulated under applicable portions of 40 CFR 60, Subpart A (General Provisions); Subpart Kb (Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for which construction, reconstruction, or modification commenced after July 23, 1984), Subpart VV (Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry); Subpart NNN (Standards of Performance for Volatile Organic Compound (VOC) Emissions from Synthetic Organic Chemical Manufacturing Industry); Subpart RRR (Standards of Performance for VOC Emissions From Synthetic Organic Chemical Manufacturing Industry Reactor Processes); 40 CFR 61 Subpart A (General Provisions); Subpart V (National Emission Standard for

Equipment Leaks); and 40 CFR 63 Subpart A (General Provisions); Subpart F (National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry); Subpart G (National Emission Standards for Organic Hazardous Air Pollutants From the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater); Subpart H (National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks); and Subpart VV (National Emission Standards for Oil-Water Separators and Organic-Water Separators). This emissions unit has been on long-term shutdown. The facility will be required to notify the Department seven days prior to startup.

Chemical Storage Tanks 486TA19 for methanol, and 480TA602 for off-spec oil, have volumes of 35,800 gallons and 50,000 gallons, respectively. These tanks are regulated by 40 CFR 60 Subpart Kb (Standards of Performance for Volatile Organic Liquid Storage Vessels [Including Petroleum Liquid Storage Vessels] for which construction, reconstruction, or modification commenced after July 23, 1984).

Dimethyl Ester (DME) Production Unit. An adipic acid manufacturing by-product stream consisting of adipic, glutaric and succinic acids (AGS) is reacted with methanol to produce dimethyl ester. Off-gases are pyrolyzed in the hydrogen plant reformer furnace. Air emissions occur only during unplanned shutdowns of the hydrogen plant #1 reformer furnace or malfunctions of the DME production unit that prevent transfer of off gasses to the reformer furnace.

Also included in this permit are miscellaneous unregulated/insignificant emissions units and/or activities.

PROJECT DESCRIPTION

This is a renewal of Title V renewal permit 0330040-018-AV, effective November 2, 2006, and incorporates the terms and conditions of Title V revision permit 0330040-029-AV, effective March 25, 2009, permit 0330040-030-AC, effective December 30, 2008, permit 0330040-033-AC, effective March 24, 2010, and permit 0330040-035-AC, effective January 4, 2011.

Title V revision permit 0330040-029-AV incorporated CP Lines' 28 & 29 conversion to pelletizing. Permit 0330040-030-AC allowed vaporizer modernizations and conversion of Continuous Polymerization Lines 22 and 23 to pellets. Permit 0330040-031-AC, effective March 16, 2009, allowed the modification of 0330040-027-AC to update past actual and future projected actual NOx emissions from those given in 0330040-027-AC. Permit 0330040-032-AC, effective August 14, 2009, was the transfer of ownership and name change from Solutia to Ascend Performance Materials LLC. Permit 0330040-033-AC allowed the conversion of Continuous Polymerization Lines 16 and 17 to pelletizing. Permit 0330040-034-AC, effective August 13, 2010, allowed equipment and process changes necessary for the Area II Adipic Acid Production Increase (from 850 to 930 MAR). Permit 0330040-035-AC incorporated and superseded permit 0330040-034-AC, allowing adipic acid production to be further increased to 990 MAR. Permit0330040-036-AC incorporates and supersedes 0330040-035-AC and allows adipic acid production to be further increased to 1080 MAR with off-setting emissions reduction projects, but its terms and conditions are not a part of this renewal/revision because its associated construction is not yet completed.

PROCESSING SCHEDULE AND RELATED DOCUMENTS

Renewed Title V Air Operation Permit (0330040-018-AV) effective November 2, 2006
Title V Air Operation Permit Revision (0330040-026-AV) effective April 29, 2008
Title V Air Operation Permit Revision (0330040-029-AV) effective March 25, 2009
Application for a Title V Air Operation Permit Renewal received March 21, 2011

PRIMARY REGULATORY REQUIREMENTS

Title III: The facility is identified as a major source of hazardous air pollutants (HAP).

Title V: The facility is a Title V major source of air pollution in accordance with Chapter 62-213, Florida Administrative Code (F.A.C.).

PSD: The facility is a Prevention of Significant Deterioration (PSD)-major stationary source of air pollution in accordance with Rule 62-212.400, F.A.C.

NSPS: The facility does operate units subject to the New Source Performance Standards (NSPS) of 40 Code of Federal Regulations (CFR) 60.

NESHAP: The facility does operate units subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) of 40 CFR 63.

CAIR: The facility is subject to the Clean Air Interstate Rule (CAIR) set forth in Rule 62-296.470, F.A.C.

CAM: Compliance Assurance Monitoring (CAM) applies to Emissions Units 032 and 020. Emission Unit 032 has federally enforceable limits for carbon monoxide, nitrogen oxides, and volatile organic compounds. In addition, steam injection to control NO_x emissions. Therefore CAM is required for NO_x. Emission Unit 020 only has emission limits for CO and VOC when controlled by the backup Thermal Oxidizer (OBUD). In addition, the potential uncontrolled emissions are greater than 100 TPY. Therefore, CAM is applicable for CO and VOC emissions when the backup Thermal Oxidizer is in service.

PROJECT REVIEW

This permit renewal includes some substantial revisions. Ascend submitted permit application 0330040-035-AC in 2010 to increase the permitted annual capacity for adipic acid production in Emissions Unit 002 from 850 MAR (million pounds annual rate) adipic acid to 990 MAR based on a 12-month rolling basis. Ascend has the ability to produce more than the currently permitted 850 MAR adipic acid by increasing the currently permitted 92,000 lbs/hr KA feed rate to 98,000 lbs/hr KA feed rate and emphasizing minimization of equipment down-time and enhanced management of the unit operation cycle times associated with the process. A portion of the adipic acid production is dried and sold to support a segment of customer demand. The remainder of adipic acid production is processed into nylon salt for the manufacture of nylon polymers. Under PSD rules, the project was a minor modification by accepting limits on NO_X and SO_2 emissions, and limits on heat inputs, fuel usage and production rate in some emissions units.

Boiler No. 10 (Emission Unit 100, permits 0330040-019-AC and 0330040-022-AC) was not constructed and was removed from this permit as part of the emissions offsets to increase adipic acid production.

The existing Dimethyl Ester (DME) Production Unit (Emission Unit 077) was added as a regulated emission unit because it became subject to Federal Regulations; 40 CFR 63 Subparts F, SS, UU, YY, and FFFF, and increased production.

CONCLUSION

This project renews Title V air operation permit 0330040-018-AV, effective November 2, 2006, and incorporation of the terms and conditions of Title V revision permit 0330040-029-AV, effective March 25, 2009, permit 0330040-030-AC, effective December 30, 2008 (to convert CP 22 and CP 23 to pellet), permit 0330040-033-AC, effective March 24, 2010 (to convert CP 16 and CP 17 to pellet), and permit 0330040-035-AC, effective January 4, 2011 (increase production from 850 MAR adipic acid to 990 MAR).

Facility-Wide Potential Emissions

Emissions Unit(s)/Pollutant	CO	NO_X	SO_2	PM/PM_{10}	VOC
002 - Adipic Acid		1197			
014, 015, 016 - Boilers 4,5,6			20,988		
004, 003 - Boilers 7,8	480	197		340	62
099 - Boiler 9	94	35			
005, 007-011, 013, & 075 - Vaporizers		81			
020 - Cyclohexane Oxidation Process	360				110

032 - Cogeneration Plant	366	467			48
042 - Nitric Acid Plant		360			
060-064 & 079 - Adipic Acid Dryers				162	
081 & 082 - CP & Batch Polymerization Lines					131
TOTAL	1,300	2,337	20,988	502	351