B4359
MAWILA

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
**ACTIVITY REPORT: Scheduled Inspection**

B435929024

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| **FACILITY:** BASF CORP | | **SRN / ID:** B4359 |
| **LOCATION:** 1609 BIDDLE AVE, WYANDOTTE | | **DISTRICT:** Detroit |
| **CITY:** WYANDOTTE | | **COUNTY:** WAYNE |
| **CONTACT:** Jordan Thompson , Senior EHS Specialist | | **ACTIVITY DATE:** 04/01/2015 |
| **STAFF:** Todd Zynda | **COMPLIANCE STATUS:** Non Compliance | **SOURCE CLASS:** MAJOR |
| **SUBJECT:** 2015 Targeted Inspection | | |
| **RESOLVED COMPLAINTS:** | | |

REASON FOR INSPECTION: Targeted Inspection
INSPECTED BY: Todd Zynda, AQD
PERSONNEL PRESENT: Jordan Thompson, Senior EHS Specialist; Tom Wharton, EHS Specialist; Joe Evans, TPU Plant Manager; Pete Greer, Senior Process Engineer; Larry Ouellette, Polyol Plant Shift Supervisor; R. Duane Hoagland, Wyandotte Resins Technical and Engineering Manager
FACILITY PHONE NUMBER: (734) 324-6523
FACILITY WEBSITE: www.basf.com

## FACILITY BACKGROUND

BASF Corporation (BASF) is located in Wyandotte, Michigan on the east side of Biddle Avenue, along the Detroit River, between Goddard Road and Ford Road in a primarily industrial setting. A mixture of commercial and residential areas is located immediately to the west across Biddle Avenue.

BASF's Wyandotte operations comprise three separate stationary sources: (1) chemical production plants with a Standard Industrial Classification (SIC) major grouping of 28 and identified as State Registration Number (SRN) B4359; (2) plastics production plants with an SIC major grouping of 30 and identified as SRN M4777; (3) laboratory and research operations with an SIC major grouping of 87 and identified as SRN M4808. Polytech Moulding (N7238) and Abbott Laboratories (P0164) also operate manufacturing plants at this site.

BASF's chemical plant operations comprise the Polyols Manufacturing Plant, the Analytical Chemistry & Chemical Engineering (ACCE) plant, the Thermoplastic Urethane (TPU) plant, the Joncryl Polymers plant, and the Steam Generating Facility. The BASF Chemical Plants were issued Renewable Operating Permit No. MI-ROP-B4359-2003 on December 1, 2003. The ROP has since been amended to incorporate subsequent permits to install.

## PROCESS OVERVIEW

The Polyols Plant manufactures conventional and graft polyether polyols for sale to the urethane industry. Conventional polyether polyols are hydroxyl-functional polymers manufactured from the polymerization of propylene oxide or ethylene oxide (or both) following an initial bond of the epoxide to a low molecular weight multifunctional alcohol (e.g. a diol, a triol, etc.). Graft polyether polymers are manufactured from the polymerization of styrene or acrylonitrile (or both) in the presence of a matured conventional polyether polyol product; the resulting copolymer consists of a vinyl polymer dispersed within the conventional polyether polyol. Polyether polyols are sold to the urethane industry for reaction with diisocyanates to form polyurethanes. Four reactor systems are operational at the plant. Reactor systems No. 7 (reactor TK-405B), No. 8 (reactor TK-405C), and No. 9 (reactor TK-405D) are used to produce conventional polyether polyols through a batch process. Graft polyether polyols are produced in reactor system No. 10, which includes a batch reactor (R-500) and a continuous reactor (R-528) operating in parallel. The Polyols Plant also encompasses storage tanks and emissions control equipment, including a water scrubber, a baghouse, and a thermal oxidizer.

The Analytical Chemistry and Chemical Engineering (ACCE) unit, now referred to as Chemical Engineering Research (CER), manufactures several small quantity products and provides research services. The research services provided by CER are included within SRN M4808. The manufacturing operations included in SRN B4359 encompass three small scale reactor systems, bulk storage areas and an acid scrubber system.

The Thermoplastic Urethane (TPU) Plant mixes, heats, and reacts raw materials to produce thermoplastic polyurethane elastomers. The elastomers solidify on a belt line, are cut to the desired size, and stored in silos. Raw material drums are equipped with carbon beds, the heated zone of the belt line is vented to a water scrubber, and the storage silos are equipped with a baghouse.

The Joncryl Polymer Plant, now referred to as Wyandotte Resins (WYR), manufactures emulsion polymers and solid or liquid grade resins. The emulsion production process and the resin production process consist of four reactor trains each, accompanied by associated raw material and product storage tanks, resin cutting vessels, and product finishing operations. The majority of volatile organic compound emissions are controlled by a regenerative thermal oxidizer (RTO) and particulate emissions are controlled by a fabric filter.

The Steam Facility and Ancillary Operations houses four boilers; each boiler has a heat input capacity of approximately 49.9 million British thermal units (MMBtu) per hour and is permitted to burn both natural gas and no. 6 fuel oil. The boilers previously provided steam for the entire site; however, since 2006 BASF has purchased steam from a nearby utility and the operation of the on-site boilers has been discontinued. Natural gas fired and diesel fired generators and a groundwater treatment system are also included in this group.

## COMPLAINTS

The most recent complaint for the facility occurred on September 16, 2009. The complaint was in regard to offsite solvent odors in the residential area west of the facility. A complaint investigation was conducted on September 17, 2009. Odors were not detected during the investigation. Additional complaints have not been received since this incident.

## OUTSTANDING VIOLATIONS

There are two outstanding violations for the facility, both relating to the regenerative thermal oxidizer (RTO) at WYR (formerly Joncryl Polymers Plant). On January 5, 2010, a violation notice was issued for the venting of uncontrolled emissions to a bypass stack, rather than venting to the RTO. On May 21, 2012, a similar violation was issued for the venting of uncontrolled emissions through the bypass stack, rather than venting to the RTO. A PTI application was submitted on July 2, 2015 to modify the special conditions regarding the RTO and use of the bypass stack during emergency or maintenance operations. However, a PTI with revised conditions has not been issued.

## INSPECTION NARRATIVE

On March 31 and April 1, 2015 the Michigan Department of Environmental Quality (MDEQ) Air Quality Division (AQD) inspector, Mr. Todd Zynda, conducted an unannounced inspection of BASF Chemical Plants at 1609 Biddle Avenue, Wyandotte, Michigan. During the inspection, Mr. Jordan Thompson, Senior EHS Specialist, and Mr. Tom Wharton, EHS Specialist provided information and a tour of facility operations relating to air quality permits. Additional BASF personnel at each plant at the facility provided information and tours of their respective plant. The inspection was conducted to determine the facility's compliance with the Natural Resources and Environmental Protection Act (NREPA), Act 451, Part 55, ROP No. MI-ROP-B4359-2003b, and permits to install (PTI) 272-04, 84-07, 113-07, 174-08, 143-09, and 80-11.

On March 31 7:45 AM, Mr. Todd Zynda (AQD) arrived onsite and performed outside observations. Prior to entering the facility observations were made (limited to the facility's property boundary along Biddle Avenue). No visible emissions were observed. Odors were not detected at the property boundary. At 8:00 AM Mr. Zynda entered the facility, stated the purpose for the inspection, and was greeted by Mr. Thompson. Prior to the inspection a visitor pass was obtained at the administration building.

During the opening meeting, the BASF operations and MI-ROP-B4359-2003b and PTI conditions were discussed. Mr. Thompson was informed that the inspection of B4359 would likely take place over the next couple days. During the opening meeting an inspection checklist outlining ROP and PTI requirements (Attachment A), was discussed. Additionally, the BASF operations site layout was discussed. Records were provided via email on May 1, May 11, June 3, June 11, June 12 June 19, June 25, and August 19, 2015.

On March 31, 2015 inspection of the Steam Facility and Ancillary Operations, CER, and TPU Synthesis Manufacturing Unit was conducted. On April 1, 2015 inspection of the Polyol Manufacturing Plant and WYR (Joncryl Polymer Plant) was conducted.

Steam Facility and Ancillary Operations

The steam generating facility and ancillary operations was inspected on March 31, 2015. The steam generating facility comprises four natural gas-fired boilers, each with burners capable of combusting #6 fuel oil as a backup. The steam generating facility has been shut down since March 15, 2006. All steam at the plant is now provided by the City of Wyandotte's municipal power plant located approximately a half-mile south of BASF. During the inspection, the building that houses the boilers was observed, but the actual boilers were not observed. According to Mr. Thompson, BASF is considering either restarting the boilers, or installing new package boilers that would operate on natural gas with propane as a backup fuel. Mr. Thompson stated that BASF is also looking into installing cogeneration equipment. At the time of the inspection, BASF still receives steam from the City of Wyandotte. Mr. Thompson indicated that BASF will submit the appropriate PTI application after BASF has made a determination on future steam and power needs.

Additionally, during the inspection, the three diesel fire pump engines were observed. The engines are located on south side of BASF property adjacent to the large water storage pond. The engines are used to pump water from the storage pond to the BASF fire suppression system. In addition, the two natural gas emergency generators installed at the site were observed.

The groundwater treatment system building was also observed during the inspection. According to Mr. Thompson, the system will be operating for the foreseeable future. The steam facility, groundwater treatment operations, and generators/fire pumps are all associated with the general administration of the site and therefore under the umbrella of the B4359 stationary source because the Chemical Plants are the dominant SIC footprint at the Wyandotte operations.

Polyols Plant

The Polyols plant produces conventional and graft polyols in four reactor trains. Polyols are sold to customers as an ingredient in the production of urethane foams for application in the automotive and housing industries. The reactor systems comprise raw material storage tanks (including tanks for ethylene oxide, propylene oxide, acrylonitrile, and styrene), blending and reaction and process vessels, and finished product storage tanks. VOC emissions from storage and process areas vent to a common duct and then through a thermal oxidizer. Emissions from solid raw materials transported to, and added to, reactors are controlled with fabric filters.

The Polyols plant was visited on April 1, 2015 from approximately 8:30 AM to 10:30 AM. During the inspection, Mr. Larry Ouellette, Polyol Plant Shift Supervisor provided a tour of the plant. The tour began with observation of the raw material storage areas for ethylene oxide (EO), propylene oxide (PO), acrylonitrile, and styrene. Raw materials are delivered by railcar along tracks entering the plant from Alkali Street and ending to the north of the polyol area. EO, PO, acrylonitrile, and styrene are either equalized (vapor balanced) during unloading to storage tanks lining the railroad tracks; if not equalized then the emissions are vented to the thermal oxidizer.

In addition, toluene diisocyanate (TDI) and methylene diisocyanate (MDI) transfer stations were observed. TDI/MDI transfers are vapor balanced to and from TDI tank TK-536 and MDI tank TK-122. Breathing losses are emitted out the top of the storage tanks through carbon adsorption canisters. According to Mr. Ouellette, the carbon adsorption units are changed out every six months. Nitrogen blankets are also employed during storage and transfer to suppress working and breathing losses. Loading or unloading operations were not observed during the inspection. Following observation of the TDI and MDI transfer stations, a walkthrough of the polyol tank farm was conducted.

During the inspection the conventional polyol reactor train numbers 8 and 9 were in operation. Reactor train number 7 was not in operation. According to Mr. Ouellette, reactor train number 7 has not been in operation for a number of years and there is currently no plan to operate reactor train number 7 in the future. The graft polyol reactor train no. 10 was in operation. During the inspection the Polyols plant control room was observed. The T-152/153 oxide scrubbers registered a combined flow of 178 gallons per minute and pH readings of 12.8 and 13.0. A water scrubber (T-408) controls emissions from various ancillary vents at the conventional side of the process; the water flowrate measured 202 gallons per minute. Filters for the conventional reactors capture magnesol, a solid particle used to recover catalysts from the product; particulate emissions and fabric filter

controls from the magnesol conveying and charging system are independent of the thermal oxidizer control system. The filters actively collect particulate for brief periods in time and were not in use when observed. The thermal oxidizer combustion temperature gauges read 1818°F and 1819°F and the waste gas valves for the processes were positioned open to the oxidizer on the plant process control screen. The thermal oxidizer controls the majority of volatile organic compound vent streams for each of the four reactor trains.

The Polyols plant maintenance area cold cleaner was observed. The lid was closed and a sign was posted instructing users to keep the cleaner closed when not in use. The lid to this cleaner is mechanically assisted and requires the toggling of a switch to open and to close.

Chemical Engineering Research
The CER plant (formerly ACCE) mixes pilot-scale research activities with small-scale chemical manufacturing operations. Polyols are a commercial product from this plant. The research and development activities are covered under SRN M4808 and manufacturing activities are covered under SRN B4359.

The CER plant was visited on March 31, 2015 from approximately 10:30 AM to 12:00 PM. During the inspection, Mr. Pete Greer, Senior Process Engineer, provided a tour of plant operations. The facility has several smaller size reactors ranging from 10 to 160 gallons that are used for pure research (SRN M4808). Emissions are controlled by vacuum pumps with dry ice traps. Additionally, CER contains three reactors for polyol production or research. The smaller 60 gallon R-20 and 250 gallon R-100 reactors are more often utilized for research and development while the larger 2,000 gallon R-30 reactor is more often utilized for commercial manufacture. A wet scrubber and vacuum jet condenser controls are applied for emissions control under either scenario. The wet scrubber located in Building 55R controls emissions from reactor vents and raw material tank air displacements. The north/south (N/S) vacuum jet condensers located in Building 55R or the east/west (E/W) vacuum jet condensers located in Building 53Z, control emissions from oxide stripping. During the inspection, the oxide scrubber control panel in Building 55R showed a T-110 wet scrubber pump outlet pressure of 1.03 bar. According to Mr. Greer, an alarm sounds at 2 bar and the pH is sampled monthly. The operations log entry for April 1, 2015 showed a scrubber water concentration of 56.8% and a pH of 2.1. The north/south vacuum jet was in operation at the time of the inspection and registered a temperature of 16.8°C (or 62.2°F). An alarm will sound if temperature reaches 45 °C.

Building 55R also contains support laboratories for WYR, which includes bench scale autoclave reactors (included under SRN M4808).

During the inspection, a newer emission unit EUMARS7 was observed. EUMARS7 was installed in 2012. According to Mr. Thompson, BASF is applying Rule 290 to EUMARS7. EUMARS7 produces catalyst, through a process that takes an existing catalyst (vanadium) and improves the efficiency. Emissions from EUMARS7 are controlled by a venturi scrubber and dust collector.

The permitted Poly-THF (ROP), the CheGraft (PTI 84-07), and the Organic Activator (PTI 80-11) processes at CER were not in operation. According to Mr. Pete Greer Poly-THF has not been made in 15 years. The organic activator production has not been in operation since 2012.

TPU Plant
The TPU plant produces a thermoplastic polyurethane elastomer from diols, MDI, and solid materials. Raw materials are mixed together and conveyed by belt through an oven. Upon release from the oven the solid product is cut, stored, and packaged. Carbon adsorbers and water scrubbers are employed for VOC emissions control; dust collectors are used for particulate emissions control. Two process lines are currently installed at the plant.

The TPU plant was visited on March 31, 2015 from approximately 1:30 PM to 3:00 PM. During inspection of the TPU plant, Mr. Joe Evans, Plant Manager provided a tour of facility operations. Two MDI storage tanks are installed inside the plant with a carbon adsorption control located on the top of the tank. Transparent carbon-filled sleeves are installed on the top of each adsorption unit as a color gauge. The carbon is initially purple in color and turns brown as the carbon in the drum is exhausted. These sleeves were inspected and observed colored purple, indicating that the carbon was newer.

Both Line 1 and Line 2 were in operation at the time of the inspection. Particulates escaping the mixing pot are drawn into the F-4185 baghouse which registered a differential pressure of 7.2 inches water column; the

baghouse serves both lines. Emissions from each oven's hot zone are vented to a water scrubber. The older Line 1 is equipped with a two-stage scrubber that registered flows of 40 gallons per minute and 42 gallons per minute in the respective stages at 2:34 PM; the newer Line 2 registered a flow of 175 gallons per minute.

The mix pots are cleaned in a Rule 290 natural gas burnoff oven located to the northeast of the TPU plan. During the inspection the oven was not in use. According to Mr. Evans, the burnoff oven is usually operated every other day.

The TPU plant also operates three extruder lines (2 double screw lines, and one single screw line). Rule 286(a) excludes from the requirement to obtain a Permit to Install "[p]lastic extrusion . . . and associated plastic resin handling, storage, and drying equipment." This exemption applies to the TPU extruding lines and plastic storage silos. This equipment is still required to comply with Rules 301, 331, 901, and 910. Observations during the inspection on March 31, 2015 suggest compliance with these requirements, as visible emissions and off-site odors were not noted during the site visit.

Wyandotte Resins Plant (Joncryl Polymers Plant)
The WYR Plant (formerly referred to as Joncryl Polymers plant) manufactures polymers and resins for inks, varnishes, and industrial coatings utilized in the printing and packaging industries. Raw material monomers, surfactants, initiators, and water are reacted to form emulsion polymers and solid and liquid grade resins. Resin cutting, product drumming and storage, and a product warehouse are sited at the plant. This is a relatively new facility and designed such that the majority of emissions points throughout the plant are ducted to a regenerative thermal oxidizer (RTO) for the control of VOC emissions. A fabric filter controls particulates from other ancillary emissions points not exhausting through the RTO.

The Joncryl plant was visited on April 1, 2015 from approximately 10:30 AM to 12:00 PM. During the inspection, Mr. R. Duane Hoagland provided information and a tour of the facility. According to BASF the solid grade oligomer (SGO) reactor trains, potentially subject to NSPS DDD, have not produced and will not be producing polystyrene (and thus will not be subject to the standard). During the inspection, the pressure across the F-1091 fabric filter measured 5.2 inches water column; the range for proper operation is set at 1 to 7 inches water column. The F-1091 fabric filter stack vents horizontally out the north side of the main Joncryl process building. The RTO temperature measured 1608 °F. A bypass stack is installed prior to the RTO and its exhaust stack.

During the inspection the emulsion reactor trains and solid/liquid grade (SGO) reactor trains were observed. The reactor trains are contained on the upper floors of WYR process building. The reactors contain pressure safety valves, that if ruptured, vent uncontrolled to the atmosphere in a tall stack located on the south side of the process building. According to Mr. Hoagland, the last rupture occurred approximately month ago, prior to that a rupture occurred approximately five years ago. On the 1st floor of the process building is the polymer cooling belts (three lines (EUSGOCOOLBELT). After cooled the material is ground to size (controlled by F-1091) and transferred to storage silos for bagging. Additionally, on the 1st floor is the finished material drum line. At this location, both emulsion polymer product and resin product is packaged in drums for shipment.

To the east of the main processing building is the raw material tank farm. Raw material arrives by truck or rail. Where applicable, emissions are controlled by the plant RTO.

The bagging line and warehouse (EUJONBAGGING, PTI 174-08) at the southern end of the site. The warehouse was not visited during the inspection.

**Compliance Status:**
Stationary source B4359 is currently covered under MI-ROP-B4359-2003b, issued December 1, 2003 and last amended January 8, 2007. The Steam Facility is covered in Section 1, the Polyols Plant in Section 2, the ACCE Plant (now referred to CER) in Section 3, and the TPU Plant in Section 4. The Joncryl Plant (now referred to as Wyandotte Resins [WYR]) is not yet incorporated into the ROP. In addition, certain equipment is covered under Permit to Install Nos. 272-04 (issued January 19, 2005), 84-07 (issued July 6, 2007), 113-07 (issued May 23, 2007), 174-08 (issued June 30, 2008), 143-09 (issued July 31, 2009), and 80-11 (issued September 1, 2011); these permits will be incorporated into the ROP during renewal.

Prior to the inspection of March 31, 2015 and April 1, 2015 the last site inspection was conducted on September 26 and 27, 2013, with the last full compliance evaluation covering compliance activities reviewed through approximately September 30, 2013. In general, this report covers compliance activities that have occurred since

October 1, 2013 through approximately April 1, 2015. A request for information from BASF was received on May 1, May 11, June 3, June 11, June 12 June 19, June 25, and August 19, 2015. BASF claims certain selected data within the submittal as "Confidential Business Information". This requires further follow-up as a portion of the information discloses pollutant emissions, which is not eligible for confidentiality, and another portion of the information discloses production information that is already reported within the annual emissions inventory for the source. Therefore, AQD does not necessarily agree with BASF's assertions. However, for the purpose of processing this report the information will be treated as confidential until a final determination is reached.

**MI-ROP-B4359-2003b, Sections 1 through 4, General Conditions**
These general conditions (GC) are repeated at the beginning of each ROP section and are addressed here in total.

GC 9, GC 10 – **COMPLIANCE** – Collected air contaminants shall be removed to maintain controls at required collection efficiency; air cleaning devices installed and operated in a satisfactory manner – Controls were installed and operating as directed by the ROP during the March 31, 2015 and April 1, 2015 inspections.

GC 11 – **COMPLIANCE** – Visible emissions limited to 20% over a six-minute average, with the exception of one 27% opacity per hour unless otherwise specified in the ROP or in a federal new source performance standard. This limit applies to point source (non-fugitive) emission units at the plant. During the inspection on March 31, 2015 and April 1, 2015 visible emissions were not observed.

GC 12 – **COMPLIANCE** – Nuisance emissions prohibited – No citizen complaints has been received by the AQD's Detroit Office for the BASF Wyandotte operations in the period since the last inspection.

GC 19 through 23, 25 (and under individual EU/FG tables at SCs III.B.IV.1 through 3) – **COMPLIANCE** – Certification of reports and prompt reporting of deviations – Annual certifications and semiannual deviation reports were received or postmarked March 4, 2015, September 11, 2014, and March 17, 2014. Please see reports B435928757, B435927044, and B435924878.

GC 24 – **COMPLIANCE** – Submissions to the Emissions Inventory – The AQD received this facility's 2013 and 2014 MAERS databases on (or postmarked) March 16, 2015 and March 17, 2014.

**MI-ROP-B4359-2003b, Sections 1 through 4, SOURCE-WIDE**
These plant-wide special conditions (SC) are repeated at the beginning of each ROP section and are addressed here in total.

SC II.B.1.1 and 2.2, III.A.3.2 and 3 – **COMPLIANCE** – Hazardous Air Pollutant (HAP) emissions limited to less than 9.0 tons per 12-month rolling time period for each individual HAP and 22.5 tons per 12-month time period for combined HAPs; records; these requirements apply to the three stationary sources B4359, M4777, and M4808 combined.

BASF provided site-wide HAP emissions totals for the period February 2013 through February 2015 in the March 27, 2015 submittal for M4777. Monthly total HAP emissions range between 0.936 and 0.998 tons. Acrylic acid registered the highest total of any single HAP for a 12-month rolling period at 2.64 tons. BASF reported that the highest 12-month rolling total HAPs occurred during March 2013 at 11.9 tons.

SC III.A.3.1, IV.4, VI.1 and 2 – **UNDETERMINED** – Compliance with certain requirements within 40 CFR 61, Subparts A, M: National Emission Standard for Asbestos, and FF: National Emission Standard for Benzene Waste Operations – During the inspection, a conversation was held with Mr. Thompson regarding the Subpart FF requirements. Mr. Thompson did not believe that BASF was subject to Subpart FF, and could not think of any operations subject to the requirements. Records were not reviewed for these standards during the inspection or records request. Subpart A, M and FF will be evaluated in greater detail during the ROP renewal process.

**MI-ROP-B4359-2003b, Sections 1 through 4, Rule 290 Flexible Groups**
Multiple sections of the ROP contain flexible group and/or emission units relating to Rule 290 subject equipment installed in each area (section) of the ROP. R 336.1290 exempts from R 336.1201 those sources with limited emissions. The rule is divided into three general sections and further divided into subsections, depending on the type of emission (VOC, particulate, etc.), the carcinogenicity of the emissions, and the health-based screening

level(s) of the emissions. Only those rules applicable to the Rule 290 emission units at the stationary source will be addressed.

R 336.1290(a) through (d) – **COMPLIANCE** – Emissions less than 1000 lbs. uncontrolled and 500 lbs. controlled with more restrictive limits for certain ITSL/IRSLs; particulates limited to emissions of 0.01 lbs. particulate per 1000 lbs. gas, controlled by dust collector or equivalent installed and maintained, 5% opacity limit and monthly visible emission observation; description on file and records maintained. Required records are as follows for each emission unit: written description of the emission unit and control device, including the design control efficiency and exhaust gas flowrate; identify air contaminants emitted, carcinogenicity, screening level, and level of control; monthly emissions calculations; record of monthly visible emission readings.

The following emission units are listed as Rule 290 subject in the 2014 MAERS with their reported annual emissions in pounds:

2014 MAERS emissions reported (in pounds)

| Section | Emission Unit | VOC | PM10 |
|---|---|---|---|
| 1 | EUSTENWORKGROUN | 0.34 | ------ |
| 2 | EUPOLGRAFTINDEX | 323 | ------ |
| 2 | EUPolSugarPent | Did not operate | |
| 2 | RGPOLTANKS | 5,560 | ------ |
| 3 | EUCheBlends | 6 | ------ |
| 3 | EUCheEpilmine | Did not operate | |
| 3 | EUCheGraftedPoly | 3,777 | ------ |
| 3 | EUCHEGRAFTINDEX | Did not operate | |
| 3 | EUCheHalfEster | 8 | ------ |
| 3 | EUCheMacromer | Did not operate | |
| 3 | EUCheNMP | 13 | ------ |
| 3 | EUCHEHardlen | 2 | ------ |
| 4 | EUTPUFURNACE | 94 | 142 |
| 4 | EUTPUSYNTHESIS | 2,449.9 | 84 |

The emission unit EUTPUFURNACE is also reported to have emitted 313 pounds of CO, 146 pounds of NOx, and 10 pounds of SO2 during the 2014 calendar year. In addition, four Rule 290 emission units are listed (EULuwBatch, EULuwCont, EULuwWW, EULuwFug) that relate to the shutdown Amino Resins Plant.

While not conclusive, as Rule 290 data is evaluated for compliance month-by-month, the annual emissions data largely suggests compliance with the Rule 290 emission limits because they are well beneath the controlled limit extrapolated for a calendar year (6,000 pounds). RGPOLTANKS, consists of 23 storage tanks (containing polyol and MDI) so the average annual emission from any single tank is likely less than a ton.

In an August 19, 2015 correspondence email, BASF provided Rule 290 emissions records on a monthly basis for TPU and CER emissions units. In addition, EUPOLGRAFTINDEX monthly emission records were provided. The Rule 290 records substantiate the MAERS submittal and also demonstrate that emissions are less than the Rule 290 limits.

**MI-ROP-B4359-2003b, Sections 1 through 4, Cold Cleaner Flexible Groups**

Currently, one cold cleaner is installed at the Polyols plant. During the previous inspection a second cold cleaner was identified at the WYR (Joncryl Plant). According to the May 1, 2015 submittal, WYR does not operate a cold cleaner. The Polyol plant cold cleaner is consider a "new" cold cleaner subject to the requirements of Rule 707.

SC II.A.1.1 – **COMPLIANCE** – Less than 5% of any combination of methylene chloride, perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, and chloroform – The MSDS for the cleaning solvent, "Safety-Kleen Premium Solvent", is provided in the May 1, 2015 submittal and indicates the solvent is composed of 100% petroleum distillates (CAS #64742-47-8).

SC I.C.1 through 3, III.A.3.1 through 5, V.1 through 5, VI.1 – **COMPLIANCE** – Cold cleaner operational requirements, including draining parts, closing cover when not in use, posting operating procedures near the

cleaner, and storing waste solvents in closed containers; cold cleaner operational requirements are based on the type of cleaner and the vapor pressure of the solvent; information on each cold cleaner to be maintained on file.

The Polyols plant houses one cold cleaner. The Polyols cold cleaner was observed during the inspection and information on the polyol cold cleaner was provided in the May 1, 2015 submittal. The vapor pressure of the solvent is reported at 0.2 mmHg (0.004 psia). The cover was observed to be closed and signs posted near or on the cleaner with proper procedures (keep cover closed when not in use, etc.); therefore, the cold cleaner is judged in compliance with SCs I.C.1 and VI.1. I judged the air/vapor interface to be less than 10 square feet and therefore in compliance with SC V.1.a. The solvent in the Polyols cold cleaner is agitated and its lid motorized, in compliance with SC I.C.2.

**MI-ROP-B4359-2003b, Sections 1-4, NSPS Tanks Flexible Groups**

NSPS Subpart Kb – **COMPLIANCE** – This subpart regulates volatile organic compound storage tanks that commenced construction or modification after July 23, 1984. The affected facility is defined at 40 CFR 60.110b as storage vessels containing volatile organic liquids (as defined in the subpart) and with capacities greater than or equal to 75 cubic meters (19,813 gallons).

Multiple sections of the ROP contain either a general flexible group or specific conditions to encompass requirements applicable to all NSPS subject storage tanks installed in each area (section) of the ROP. References to NSPS Kb in the ROP are as follows:

FGPOLNSPSKBTANKS (Section 2 – emission unit table – contains list of tanks)
FGPOLFACILITY, SC V.3 (Section 2)
EUCHEPOLYOL, SC V.1 (Section 3)
EUCHETK-43 (Section 3)

Please see the May 1, 2015 submittal for tanks subject to this subpart at the stationary source and how they comply with NSPS Kb. Not all tanks listed in the ROP as NSPS Kb subject remain so because after the October 2003 revision to NSPS Kb, those tanks sized less than 75 cubic meters but greater than 40 cubic meters, formerly subject to NSPS Kb, are no longer subject to the regulation.

**MI-ROP-B4359-2003b, Section 1, FGSTEFACILITY**

The steam facility shut down on March 15, 2006. Steam is now received from the Wyandotte municipal power plant via an overland steam line. In the 2014 and 2013 MAERS submittals BASF reports zero emissions of air contaminants and zero throughput of oil, natural gas and butane through the boilers. The steam facility is in compliance with all emissions, throughput, and process specifications for the fact that the equipment was not operated in the FCE period. Within the May 1, 2015 submittal, BASF demonstrated that steam is purchased from the Wyandotte Municipal Services.

**MI-ROP-B4359-2003b, Section 2, EUPOLCONV**

This emission unit covers the conventional polyol manufacturing process (reactor trains 7, 8, and 9).

SC I.B.1 through 3 – **COMPLIANCE** – Maximum stack height and diameters for SVPOLSUGARFEED (24 inches and 32 feet), SVPOLT-408 (3 inches and 55 feet), and SVPolMagSil7 (9.75 inches by 11.5 inches and 30 feet) – During the inspection the stacks were not measured. Compliance is based on visual observation.

SC II.A.1.1 and SC III.A.3.8 – **COMPLIANCE** – Magnesium silicate (magnesol) use limited to 2,500 tons per 12-month rolling time period; records – BASF reports monthly and 12-month rolling totals for the period March 2013 through March 2015; each 12-month rolling total is less than 2,500 tons (May 1, 2015 submittal). BASF claims this data as "Confidential Business Information". In the 2014 MAERS, BASF reports 81 tons of "magnesium silicate (solid)" was processed in the EUPOLConv bulk material conveyors during the calendar year.

SC II.B.1.1 and 2, SC III.A.3.5 – **COMPLIANCE** – Aggregate volatile organic compound (VOC) emissions from reactor trains 7, 8, 9 sugar feed shall not exceed 1.27 pounds per hour based on a daily average nor 2.24 tons per 12-month rolling time period; aggregate propylene oxide (PO) emissions from reactor trains 7, 8, 9 sugar feed shall not exceed 0.18 tons per 12-month rolling time period; records.

According to the May 1, 2015 submittal, sugar is no longer used. Therefore these conditions are not applicable. According to Mr. Thompson, when sugar was used, reactor 7 was the primary reactor for sugar additions. Reactor 7 is currently not in operation as it has been de-rated. At this time, there is no plan for future use of reactor 7. VOC and PO emissions for operations not using sugar are captured in SC II.B.4 through 6 and SC III.A.3.7 as described below.

SC II.B.3.1 and SC 2, III.A.3.6 – **COMPLIANCE** – Particulate matter (PM) emissions from each solid raw material conveying system servicing reactor trains 7, 8, 9 shall not exceed 0.10 pounds per 1000 pounds of exhaust gases; aggregate PM emissions from all solid raw material conveying systems shall not exceed 1 ton per 12-month rolling time period; records.

Compliance with the pound per thousand pound limit is to be determined through stack testing in GC 13, if requested; BASF has not been requested to perform a stack test on particulate emissions. BASF reports monthly and 12-month rolling totals of PM emissions for the period April 2013 through April 2015; each 12-month rolling total for PM is less than 1.0 ton (June 3, 2015 email submittal). BASF claims this data as "Confidential Business Information". In the 2014 MAERS, BASF reports aggregate PM emissions from EUPolConv at 324 pounds (0.162 tons).

SC II.B.4 through 6, and SC III.A.3.7 – **COMPLIANCE** – Aggregate VOC emissions from reactor trains 7, 8, 9 equipment venting to the water scrubber shall not exceed 2.4 pounds per hour based on a daily average; aggregate emissions from reactor trains 7, 8, 9 equipment venting to the water scrubber shall not exceed 0.13 tons (260 pounds) PO per 12-month rolling time period and 0.02 tons (40 pounds) EO per 12-month rolling time period; records.

Compliance with the VOC pounds per hour value is to be determined through stack testing in GC 13, if requested. As discussed in a previous inspection report (MACES Report B435923233), BASF has not been requested to perform a VOC stack test on the water scrubber, however, testing for EO and PO was conducted March 18, 2009 through March 20, 2009 pursuant to an United States Environmental Protection Agency (USEPA) administrative order. Oxide emissions were measured at less than 0.1 pounds per batch and it is likely VOC emissions are of a similar order of magnitude because oxide emissions are the predominant VOC expected at the water scrubber emission point; please see report B435907772.

BASF reports monthly and 12-month rolling totals of EO, PO and VOC for the period March 2013 through March 2015; monthly VOC emissions indicate compliance with the daily VOC limit. VOC emissions are reported monthly, with the majority of monthly VOC emissions being less than 2.5 pounds. The 12-month rolling total for EO and PO is less than 0.13 tons and 0.02 tons, respectively (May 1, 2015 submittal).

SC III.A.3.1, and SC V.1 through 3 – **COMPLIANCE** – Polyol production rates for reactor trains 7, 8, 9 shall not exceed the following, each in units of pounds per 12-month rolling time period: 100,000,000 for reactor train 7; 72,000,000 for reactor train 8; 191,000,000 for reactor train 9; records.

BASF reports monthly and 12-month rolling throughputs in each reactor the period March 2013 through March 2015. As described by Mr. Ouellette during the inspection on April 1, 2015, reactor 7 has not been in operation. Therefore the monthly production for reactor 7 is zero for the last two years. The May 1, 2015 submittal for each 12-month rolling total show compliance with the 100,000,000 pounds limit for reactor train 7, the 72,000,000 pound limit for reactor train 8, and the 191,000,000 pound limit for reactor train 9. BASF claims this data as "Confidential Business Information". In the 2014 MAERS, BASF reports 15,040 tons (30,080,000 pounds) of product through EUPOLConv and 16,339 tons (32,678,000 pounds) of product through EUPOLFugConv.

SC V.4 – **COMPLIANCE** – Conventional equipment to be vented to the thermal oxidizer shall not be operated unless the oxidizer is installed and operating properly, including achieving a minimum temperature of 1700°F, a minimum residence time of 0.8 seconds, and maximum emission rates of 1.3 pounds per hour EO and 0.96 pounds per hour PO; exceptions are given in SCs V.6 through 8.

Testing conducted on December 6, 2010 through December 9, 2010 measured EO and PO beneath their respective detection limits of 0.006 pound per hour EO and 0.008 pounds per hour PO. Please see report B435915927. A graph of the continuous thermal oxidizer temperatures for April 28, 2015 is provided in the May 1, 2015 submittal; the temperature measures fluctuate within a range from about 1780°F to about 1910°F.

During the inspection on April 1, 2015 the thermal oxidizer temperature was observed operating within a range from 1818°F to 1819°F.

SC V.5 – **COMPLIANCE** – Vacuum jets for the conventional processes shall not be operated unless they vent to the thermal oxidizer – During the inspection, the process flow scheme on the computer consoles at the Polyol plant demonstrates that the vacuum jets vent to the thermal oxidizer when the conventional process is in operation.

SC III.A.3.2, and SC V.6 – **COMPLIANCE** – TK-405B, TK-405C, and TK-505 pressure releases to add solid materials shall not exceed, in the aggregate, 24 times per day nor 800 times per 12-month rolling time period; records.

BASF reports monthly and 12-month rolling total reactor depressurizations for the period March 2013 through March 2015; each monthly total demonstrates compliance with the daily limit of 24 and each 12-month rolling total is less than 800 (May 1, 2015 submittal). BASF claims this data as "Confidential Business Information".

SC V.7 – **COMPLIANCE** – The following may vent to the water scrubber: TK-410A, TK-408C except during filling and transfer operations, TK-534 after unreacted materials have been removed, the filter press, TK-532. Based on the test conducted March 18, 2009 through March 20, 2009, each of these vents to the water scrubber; please see report B435907772.

SC V.8 – **COMPLIANCE** – EO (TK-101B) and PO storage tanks (TK-101C, TK-102) shall be filled with satisfactory vapor balance in place or venting to thermal oxidizer. Satisfactory vapor balance includes: vapor-tight collection line before transfer, nitrogen purge of vapor line after transfer, hatches and openings closed, nitrogen purge of liquid line after transfer, device to minimize liquid drainage. Procedures shall be developed incorporating the listed requirements.

Based on April 1, 2015 observations of the process flow scheme on the computer consoles at the Polyol plant, this equipment is connected to the thermal oxidizer; the equipment is also equipped with a vapor balance during transfers. During the inspection on April 1, 2015, a transfer was not observed. Non-confidential procedures for EO and PO transfers were received in the May 1, 2015 submittal.

SC III.A.1, SC III.A.3.3, and SC V.9 – **COMPLIANCE** – Conventional process equipment venting to the water scrubber shall not do so unless the scrubber is operating properly; satisfactory operation includes maintaining the water scrubber flowrate specified in the water scrubber operating procedures; the liquid flowrate shall be monitored daily with an acceptable device; records.

A graph of the continuous water scrubber flowrate for April 28, 2015 is provided in the May 1, 2015 submittal; the flowrate measures within the range of about 125 to 205 gallons per minute. Water scrubber procedures were provided in the May 1, 2015 submittal. From the procedures, the water scrubber is designed to operate down to 25 gallons per minute; an alarm is triggered should the flowrate drop to 35 gallons per minute and the vent lines are shut down should the flowrate drop to 30 gallons per minute.

SC III.A.2.2 and 3, SC III.A.3.4, and SC V.10, Appendix 2-3.1 through 3 – **COMPLIANCE** – Solid raw material conveying systems shall not be operated unless the fabric filter is installed and operating properly; satisfactory operation includes maintaining the pressure drop specified in the fabric filter operating procedures; the pressure drop across each fabric filter shall be monitored with an acceptable device; periodic inspections of the baghouses to be conducted; records.

Pressure drop data for April 28, 2015 was provided in the May 1, 2015 submittal. From graph provided it appears that the pressure drop continually registers 0.2 inches of water. There is a slight increase in pressure drop to approximately 0.85 inches. From the 2007 inspection, a fabric filter is flagged as not operating properly if the pressure drop falls below 1 inch water during magnesol addition. It can be concluded that magnesol was not added during April 28, 2015.

The May 1, 2015 submittal also contained the dust collector maintenance records for F-410C.

SC VI.1 – **COMPLIANCE** – Permittee shall comply with applicable requirements of MACT A and PPP – Though not stated explicitly in the condition, as the emission unit EUPOLCONV covers the non-fugitive aspects of

conventional polyols production, this condition covers compliance with those aspects of MACT PPP addressing process vents, wastewater provisions, etc. and not those aspects of the MACT PPP that relate to leak detection and repair, which are covered under a similar condition within the flexible group FGPOLFUG.

Based on information obtained during an inspection from March 17 through 20, 2008 and from subsequent 114 (a) requests, USEPA Region 5 found BASF in violation of MACT PPP as detailed in a Finding of Violation (FOV) issued September 29, 2008 and an FOV issued September 25, 2009. On June 15, 2012, USEPA and BASF entered into an Administrative Consent Order (ACO), and on June 19, 2012, a Consent Agreement and Final Order (CAFO) between USEPA and BASF was filed which resolved the MACT PPP violations.

Since the end of the last FCE period (September 30, 2013), pursuant to 63.1439(e)(6), MACT PPP semiannual reports have been received on February 28, 2014, September 2, 2014, and March 4, 2015. Please see reports B435924742, B435926782, and B435928806.

**MI-ROP-B4359-2003b, Section 2, EUPOLGRAFT**
This emission unit covers the graft polyol manufacturing process (reactor train 10).

SC I.B.1 – **COMPLIANCE** – Maximum stack height and diameters for SVPOL115 are 24 inches and 23 feet, respectively, and exhaust gases discharged unobstructed vertically upwards. Compliance is based on visual observation during the inspection. Measurements were not collected.

SC II.A.1, SC II.B.1.1 and 2, SC III.A.3.2 and 3 – **COMPLIANCE** – Styrene emissions from storage tank TK-500 shall not exceed 9.8 pounds per hour based on a daily average nor 0.24 tons per year on a 12-month rolling time period; the styrene charge to TK-500 shall not exceed 60,300,000 pounds per 12-month rolling time period; styrene monthly/12-month emissions calculations and production records kept for five years.

BASF reports the monthly and 12-month rolling total styrene throughput for the period March 2013 through March 2015 (May 1, 2015 submittal); each of the 12-month totals is less than the 60,300,000 pound limit. BASF claims this data as "Confidential Business Information". In the 2014 MAERS, BASF reports the annual throughput of styrene at 1,680,000 gallons. At a density of about 7.56 pounds per gallon, this equates to an annual throughput of 12,700,800 pounds styrene. Styrene emissions (combined working and breathing losses) are reported at 285.6 pounds (0.14 tons).

SC III.A.3.1 and SC V.5 – **COMPLIANCE** – Polyol production rates for reactor trains 10 shall not exceed 150,000,000 pounds per 12-month rolling time period; records.

BASF reports monthly and 12-month rolling throughputs for reactor No. 10 in the period March 2013 through March 2015; each 12-month rolling total shows compliance with the 150,000,000 pound limit (May 1, 2015 submittal). BASF claims this data as "Confidential Business Information". In the 2014 MAERS, BASF reports 15,040 tons (30,080,000 pounds) of product through EUPOLConv and 23,731 tons (47,462,000 pounds) of product through EUPOLFugGraft.

SC V.1 – **COMPLIANCE** – Graft equipment to be vented to the thermal oxidizer shall not be operated unless the oxidizer is installed and operating properly, including achieving a minimum temperature of 1700°F, a minimum residence time of 0.8 seconds, and maximum emission rates of 0.88 pounds per hour acrylonitrile (ACN) and 0.74 pounds per hour styrene; exceptions are given in V.3 and 4.

Testing conducted on December 6, 2010 through December 9, 2010 measured ACN and styrene beneath their respective detection limits. Measured emission rates during the testing were 0.004 pound per hour ACN and 0.023 pounds per hour styrene. Please see report B435915927. A graph of the continuous thermal oxidizer temperatures for April 28, 2015 is provided in the May 1, 2015 submittal; the temperature measures fluctuate within a range from about 1780°F to about 1910°F. During the inspection on April 1, 2015 the thermal oxidizer temperature was observed operating within a range from 1818°F to 1819°F.

SC V.2 – **COMPLIANCE** – The vacuum system for the graft process shall not be operated unless it vents to the thermal oxidizer. During the inspection, the process flow scheme on the computer consoles at the Polyol plant indicated that the vacuum jets vent to the thermal oxidizer when the graft process is in operation. During the inspection, the waste gas valves were open.

SC V.3 – **COMPLIANCE** – Styrene shall not be charged to TK-500 unless the unloading system is satisfactorily operated; satisfactory operation includes blowing back lines to the railcar and system shutdown after use, hatches and openings closed, device or procedure to minimize liquid drainage; procedures shall be developed incorporating the listed requirements. The styrene car unloading procedures were provided in the May 1, 2015 submittal. During the inspection, a styrene transfer was not witnessed.

SC V.4 – **COMPLIANCE** – ACN storage tank (TK-524) shall be filled with satisfactory vapor balance or venting to thermal oxidizer; satisfactory vapor balance includes: vapor-tight collection line before transfer, nitrogen purge of vapor line after transfer, hatches and openings closed, nitrogen purge of liquid line after transfer, device to minimize liquid drainage; procedures shall be developed incorporating the listed requirements. The ACN car unloading procedures were provided in the May 1, 2015 submittal. During the inspection, an ACN transfer was not witnessed.

**MI-ROP-B4359-2003b, Section 2, EUPOLTKFARM**
This emission unit covers the toluene diisocyanate (TDI) storage tank TK-536.

SC I.B.1 – **COMPLIANCE** – Exhaust gases from the carbon canister on TK-536 shall discharge unobstructed vertically upwards with maximum diameter of 3 inches and height of not less than 35 feet above ground. During the inspection, compliance was determined based on visual observation. Measurements were not collected.

SC II.1 and SC III.A.3.3 – **COMPLIANCE** – TDI throughput in TK-536 shall not exceed 5,000,000 gallons per 12-month rolling time period; records – BASF reports the monthly and 12-month TDI throughput for the period March 2013 through March 2015; each 12-month total is less than the 5,000,000 gallon limit. BASF claims this data as "Confidential Business Information". In the 2014 MAERS, BASF reports the annual throughput of TDI at 680,000 gallons through RGPOLTANKS; TK-536 is not listed as a member of this reporting group, but that may be an oversight.

SC II.B.1.1 and SC 2, III.B.1 through 3 – **COMPLIANCE** – TDI emissions from TK-536 shall not exceed 0.0031 pounds per hour nor 0.18 pounds per year; TDI test to be performed on TK-536 upon request. At this time, AQD has not requested testing. Compliance with the annual limit is determined by the throughput limit and the control maintenance requirement. As the annual throughput limit is in compliance and the control system appears in compliance, the facility is presumed in compliance with the annual emission limit as well. In 2014 MAERS, for RGPOLTANKS BASF lists combined working and breathing losses at 0.61 pounds TDI, with a control efficiency of 98%.

SC III.A.1, SC V.1, 6, and 7 – **COMPLIANCE** – TK-536 shall not be operated unless the carbon canister is installed and operating properly; TDI shall not be transferred to delivery vessels unless emissions from the delivery vessels are controlled by installed carbon adsorption canisters operating properly; TK-536 carbon canisters shall be replaced every five years; a written record shall be maintained of the replacements. Records provided in the May 1, 2015 submittal, indicate that the carbon canister was replaced in June 2014 and will be replaced again in June 2015. During the April 1, 2015 inspection, the activated carbon canister installed on the top of TK-536 was observed.

SC III.A.3.2, SC V.5, and SC VI.1 – **COMPLIANCE** – Records shall be maintained of the dimensions and capacity of the storage tank TK-536, per NSPS Kb; no more than 50,000 gallons stored in TK-536 at any given time – Please see submittal of September 27, 2007, where the tank capacity is listed at 50,000 gallons, the diameter at 20.2 feet, and the height at 22 feet.

SC V.2 – **COMPLIANCE** – TDI storage and transfer facilities shall incorporate a dry air or nitrogen gas pad for moisture control. According to Mr. Ouellette, TK-536 employs a nitrogen blanket.

SC V.3 and 4 – **COMPLIANCE** – Residual or spilled materials shall be stored in closed containers preventing TDI release to the ambient air; spilled material shall be immediately contained, neutralized and stored. During the inspection, a spill or stored spill materials were not observed.

**MI-ROP-B4359-2003b, Section 2, FGPOLEMCON**
This flexible group contains requirements for the thermal oxidizer that controls both conventional and graft polyol systems.

SC I.B.1 – **COMPLIANCE** – Maximum stack height and diameter for SVPOL80 are 30 inches and 100 feet, respectively, and exhaust gases discharged unobstructed vertically upwards. During the inspection visual observation indicates that the stack meets these requirements. Measurements were not conducted.

SC II.B.1.1 – **COMPLIANCE** – VOCs from equipment venting through the thermal oxidizer shall not exceed 6.4 pounds per hour on a daily average.

Testing conducted December 4, 2001 through December 7, 2001 measured an emission rate of 1.71 pounds per hour VOC. Testing conducted December 6, 2010 through December 9, 2010 measured an emission rate less than 0.03 pounds per hour VOC. The tests are not dispositive for the VOC emission limit because the sampling periods were less than the 24 hours of a calendar day. However, in the case of the 2010 test, as BASF organized process operations so as to direct the greatest amount of VOC loading to the thermal oxidizer during the 8-hour test period, and as the VOC emissions measured during the 8-hour test period represent less than 1% of the allowed daily amount, AQD concludes the test serves as a successful compliance demonstration unless future information should suggest the maximum VOC loading rate from the process was not measured during the test. Please see report B435915927.

SC II.B.1.2, II.B.2 through 6, Appendix 2-4.2 and 3 – **COMPLIANCE** – Emissions from equipment venting through the thermal oxidizer and from the thermal oxidizer itself shall not exceed the following on a 12-month rolling time period basis: 16 tons VOC; 2.2 tons PO; 0.89 tons EO; 0.72 tons ACN; 0.41 tons styrene; 15.3 tons NOx. VOC, PO, EO, ACN, styrene, and NOx monthly/12-month calculations kept for five years.

The May 1, 2015 submittal lists monthly and 12-month rolling emissions for the period from March 2013 through March 2015; each 12-month total is less than the annual emissions limitation. BASF claims this data as "Confidential Business Information". In MAERS 2014, BASF reports emissions of 882 pounds (0.44 tons) VOC and 6604 pounds (3.3 tons) NOx for EUPOLEmCon. In addition, extrapolating the worst-case hourly emissions from the stack testing performed in December 2010 (see next set of conditions below) to annual emissions results in worst-case totals of 0.044 tons EO, 0.057 tons PO, 0.026 tons ACN, and 0.162 tons styrene.

SC III.B.1 through 3 – **COMPLIANCE** – Testing of EO, PO, ACN, and styrene between June 1, 2008 and December 1, 2008 unless demonstrated last tests remain valid.

In a letter dated July 3, 2008, BASF asserted the testing conducted in December 2001 remained valid. In an email of July 21, 2008 and a letter dated July 23, 2008, AQD agreed the December 2001 remained valid and stated testing for EO, PO, ACN, and styrene was not required in the referenced time period. Tests were conducted from December 6, 2010 through December 9, 2010 and based on the FTIR limits of quantification and the average stack flow data, the hourly emission rates are reported to be less than 0.006 pounds per hour EO, 0.008 pounds per hour PO, 0.004 pounds per hour ACN, and 0.023 pounds per hour styrene. The calculated emission rates for each pollutant are consistent across the four runs. As an overestimation, were the maximum flow extrapolated from one minute to an hour (and thus a factor of 1.6 greater), the emission rates would calculate to 0.010 pounds per hour EO, 0.013 pounds per hour PO, 0.006 pounds per hour ACN, and 0.037 pounds per hour styrene; these emission rates remain beneath the hourly rates established to indicate satisfactory operation. Please see report B435915927.

SC V.1 and 2, Appendix 2-4.1 – **COMPLIANCE** – Thermal oxidizer temperature shall be continuously (at least once every 15 minutes) monitored with an acceptable device; the position of the waste gas inlet control values to the thermal oxidizer shall be continuously monitored with an acceptable device; records of temperature and waste gas inlet control valve position – Please see discussions above under Condition V.4 of EUPOLCONV and Condition V.1 of EUPOLGRAFT.

SC VI.1 – **COMPLIANCE** – Permittee shall comply with applicable requirements of MACT A and PPP – Please see discussion above under Condition VI.1 of EUPOLCONV as it relates to the MACT PPP.

SC VI.2 and 3 – **COMPLIANCE** – Instrument for measuring liquid flowrate of water scrubber shall be calibrated, maintained, and operated according to manufacturer's specifications – Please see discussion above under Conditions III.A.1, III.A.3.3, and V.9 of EUPOLCONV.

Appendix 2-3.1 through 3 – **COMPLIANCE** – Regular inspection of thermal oxidizer; records of inspection; records of malfunctions or failures and corrective actions – In the submittal of May 1, 2015, BASF reports the last

inspection of the oxidizer occurred on April 22, 2014. The inspection did not identify any immediate issues. The inspection summary stated that the upper combustion chamber has excessive damage to the hot face and should be replaced at the next scheduled shutdown.

**PTI 143-09 and MI-ROP-B4359-2003b, Section 2, FGPOLFUG**
This flexible group contains fugitive emissions requirements for the conventional and graft polyol systems. Per PTI 143-09, the individual emission limits for EO, PO, ACN, and styrene have been removed.

SC III.A.2.1 and 2, III.A.3.1, V.1 and 2 – **COMPLIANCE** – Leak detection and repair (LDAR) shall be performed on reactor trains 7, 8, 9 as per MACT PPP; LDAR program shall be instituted for reactor train 10 equivalent to the program in Rule 628 with noted exceptions; records maintained.

Based on information obtained during an inspection from March 17, 2008 through March 20, 2008 and from subsequent 114(a) requests, USEPA Region 5 found BASF in violation of MACT PPP as detailed in a Finding of Violation (FOV) issued September 29, 2008 and an FOV issued September 25, 2009. AQD followed with Violation Notices dated October 28, 2009 and May 9, 2012 concerning MACT PPP deficiencies, similar deficiencies for NSPS VV predating the MACT, and also for failing to conduct visual inspections for pumps subject to the Rule 629 (now Rule 628) equivalent LDAR program at the graft plant. These Violation Notices were forwarded to USEPA. Please see reports B435908007 and B435917762. On June 15, 2012, USEPA and BASF entered into an Administrative Consent Order (ACO), and on June 19, 2012, a Consent Agreement and Final Order (CAFO) between USEPA and BASF was filed which resolved the MACT PPP violations. AQD considers the agreement sufficient to resolve the Violation Notices.

Since the end of the last FCE period (September 30, 2013), pursuant to 63.1439(e)(6), MACT PPP semiannual reports have been received on February 24, 2014, September 2, 2014, and March 4, 2015. Please see reports B435924742, B435926782, and B435928806. These reports include summaries of MACT PPP LDAR activities. Rule 628 LDAR semiannual reports have been received on February 24, 2014, September 2, 2014, and March 4, 2015. Please see reports B435924744, B435926772, and B435928812.

**PTI 143-09 and MI-ROP-B4359-2003b, Section 2, FGPOLFACILITY**
This flexible group aggregates permitted, exempt, and grandfathered equipment at the polyol plant and total emissions limitations. Under PTI 143-09 the individual emission limits for EO, PO, ACN, styrene, and HAPs have been removed.

SC V.1 – **COMPLIANCE** – Requirement to comply with 40 CFR 63, Subpart PPP – Please see discussion above under EUPOLCONV and FGPOLFUG.

SC V.2 – **NOT APPLICABLE** – Requirement to comply with 40 CFR 60, Subpart YYY – This subpart was proposed as Standards of Performance for VOC emissions from the synthetic organic chemical manufacturing industry (SOCMI) wastewater. To be located beginning at 40 CFR 60.770, the regulation has yet to pass beyond the proposal stage.

SC V.3 – **COMPLIANCE** – Requirement to comply with 40 CFR 60, Subpart Kb – Please see above under NSPS Tanks Flexible Groups.

**MI-ROP-B4359-2003b, Section 3, EUCHEPOLYTHF**
This emission unit covers production of poly-THF in reactors R-30, R-62, and R-63. From site inspections and reports, Poly-THF appears to not have been produced since early 2003. The emission unit is in compliance with all emissions, throughput, and process specifications for the fact that the process has not been in operation.

**PTI 272-04 and MI-ROP-B4359-2003b, Section 3, EUCHEPOLYOL**
This emission unit covers production of conventional polyether polyols in reactors R-20, R-30, and R-100. The emission unit in the ROP was modified in Permit to Install No. 272-04, issued January 19, 2005. The conditions below are from the permit to install.

SC I.B.1 through 8 – **COMPLIANCE** – Stack maximum diameters (given first in inches) and minimum heights (given second in feet) above ground level for the following stacks, all of which are required to vent vertically unobstructed upwards except SVCHE527: 1.5/50 for SVCHE054; 36/53 for SVCHE057; 2/50 for SVCHE525; 1.5/27.7 for SVCHE526; 6/31 for SVCHE527; 1.61/55 for SVCHE528; 2.1/41 for SVCHET-110; 3.1/52 for

SVCHEWJET – Compliance is based on visual observations during the inspections. Measurements were not conducted.

SC II.B.1 through 4, III.B.1 through 3, Appendix 3-4.2j through m – **COMPLIANCE** – Emissions from the polyether polyol process shall not exceed the following on a 12-month rolling time period basis: 7.22 tons VOC; 0.8 tons EO; 3.5 tons PO; 0.89 tons butylene oxide (BO). VOC, EO, PO, and BO monthly/12-month calculations kept for five years.

In the May 1, 2015 submittal, BASF reports combined EO, PO, and VOC emissions of 421.93 pounds (0.21 tons) in the period from April 2013 through March 2015. It is assumed that the BO was no used in production (zero emissions). The summation of the emissions is significantly less than all individual emission limits. From MAERS 2014, annual emissions of VOC for the emission unit are reported at 111 pounds (0.056 tons).

SC V.1 and 2, Appendix 3-4.2a and b – **COMPLIANCE** – Polyether polyol production shall not exceed 220 batches per 12-month rolling time period nor 3,300,000 pounds per 12-month rolling time period; records – From the May 1, 2015 submittal, for the period April 2014 through March 2015 BASF's production logs document 20 total batches and total 141,340 pounds of polyol produced.

SC III.A.2.5, SC V.3 and 4, Appendix 3-4.2g and h – **COMPLIANCE** – Equipment shall not vent out of the north or south vacuum jet unless the associated vacuum jet condenser system is installed and operating properly and with a condenser exhaust gas temperature of 113°F or less; equipment shall not vent out of the east or west vacuum jet unless the associated vacuum jet condenser system is installed and operating properly and with a condenser exhaust gas temperature of 140°F or less; device installed to monitor temperature continually; temperature records.

Jet temperatures are provided, in graph form, in the May 11, 2015 submittal for March 25 and 26, 2015, and April 22, 2015. Jet temperatures continually register less than 40°C (104°F). The north/south vacuum jet was in operation at the time of the inspection and registered a temperature of 16.8°C (or 62.2°F).

SC III.A.2.1 and 3 through 4 and 6, V.5, Appendix 3-4.2d through f and i – **COMPLIANCE** – Process steps involving the release of EO, PO, and/or BO shall not be operated unless the T-110 wet scrubber is installed and operating properly. Proper operation of the T-110 wet scrubber includes: (a) maintaining the scrubber solution pH to 3.0 or less; (b) maintaining the pump outlet pressure at 2.0 bar gauge or less; (c) maintaining the water concentration in the scrubber solution to 60 percent by weight or more. The scrubber solution shall be verified at the beginning of each month and whenever the scrubber solution is replaced. At the beginning of each month, the percent water by weight of the scrubber solution shall be determined and the theoretical number of batches that can be completed before 60% by weight is reached shall be calculated; the scrubber solution shall be replaced before the 60% limit is reached. A device shall be installed to monitor the pump outlet pressure. Records of the above maintained. The T-110 wet scrubber pump shall be maintained with a flow alarm. Records of alarm conditions and steps taken in response shall be kept.

Monitoring data for March 25, March 26, and April 22, 2015, and monthly production logs for July 2013 through December 2014 are included in the May 1, 2015 submittal. The daily monitoring data records the scrubber pump outlet pressure continually at 1.0 bar. The logs indicate a maximum pH of 4.5 on March 3, 2014. The high pH was checked and was determined to be 2.2 the next day March 4, 2014. As a result of the high pH on March 3, 2014, the scrubber solution was changed on March 7, 2014. The logs indicate a maximum scrubber pump outlet pressure of 1.01 on December 3, 2013, and a minimum water concentration in the scrubber solution of 59.7% on December 4, 2014, after which the scrubber solution was changed prior to the next batch. The number of theoretical batches has been calculated after each measure of the water concentration. During the inspection on March 31, 2015, the oxide scrubber control panel in Building 55R showed a T-110 wet scrubber pump outlet pressure of 1.03 bar. According to Mr. Greer, an alarm sounds at 2 bar and the pH is sampled monthly. The operations log entry for April 1, 2015 showed a scrubber water concentration of 56.8% and a pH of 2.1. Included in the May 11, 2015 submittal are the corrective actions taken in response to scrubber equipment faults (alarms).

SC III.A.2.2, Appendix 3-4.2c – **COMPLIANCE** – A visual inspection of all equipment in EO, PO, and BO service will be performed at the beginning of every month to ensure that there are no leaks; any leaking equipment shall be repaired or replaced prior to the start of any subsequent batch. Records to be kept – LDAR activities are

summarized on the monthly production sheets for July 2013 through December 2014 (May 1, 2015 submittal). No record of a leaks are reported during the reported time period.

SC V.6, Appendix 3-4.2n – **COMPLIANCE** – Magnesium silicate use limited to 77,000 pounds per 12-month rolling time period; records kept – In the May 11, 2015 submittal, BASF reports total magnesium silicate usage at 1,320 pounds in the period from April 2013 through March 2014.

SC VI.1 – **COMPLIANCE** – Permittee shall comply with NSPS A and Kb as they apply to storage tanks as ACCE. Please see above under NSPS Tanks Flexible Groups.

**PTI 84-07, EU-CheGraft and EU-CheGraftFug**
Permit to Install No. 84-07 was issued July 6, 2007. Emission units EU-CheGraft and EU-CheGraftFug cover the production of grafted polyether polyols in reactor R-3. The emission unit is also used for research and development; the permit to install enables the unit to be utilized for both purposes, similar to the manner in which EUCHEPOLYOL is utilized for research and for the production of conventional polyether polyols. The process was not in operation during the site inspection on March 31, 2015. From the information submittal of May 1, 2015, BASF reports no graft polyol was produced for the last two years. The emission units are in compliance with all emissions, throughput, and process specifications for the fact that the equipment has not been in operation.

**PTI 80-11, EUCHEORGACT**
Permit to Install No. 80-11 was issued September 1, 2011. Emission unit EUCHEORGACT covers production of organic activator in reactor R-803. The emission unit is also used for research and development. The process was not in operation during the site inspection on March 31, 2015 and appears not to have operated recently. BASF did not report any operation of the emission unit in MAERS for 2014.

**MI-ROP-B4359-2003b, Section 4**
Section 4 of the ROP contains emission units and flexible groups composing the Thermoplastic Urethane (TPU) plant. Emission units EUTPUSYNTHESIS and EUTPUFURNACE are Rule 290 emission units, addressed above. Emission unit EUTPUEXTRUSION comprises plastics extrusion equipment and associated plastic resin handling and storage equipment exempt under Rule 286(a).

**PTI 113-07, Wyandotte Resins (formerly Joncryl Polymers Plant)**
Permit to Install No. 113-07 was issued May 23, 2007 for the construction of the Joncryl Polymers Plant.

FG-RAWMATLS, SCs 1.1 and 1.4 – **COMPLIANCE** – Ethyl acrylate throughput limited to 379,000 gallons per 12 -month rolling time period; records – Monthly and 12-month rolling total ethyl acrylate throughput records are provided for the period March 2013 through March 2015 in the May 1, 2015 submittal. Each 12-month total is less than 379,000 gallons. BASF claims this data as "Confidential Business Information".

FG-RAWMATLS, SCs 1.2, 1.3, and 1.5 – **COMPLIANCE** – Comply with NSPS Kb as applicable to storage tanks EUJONTK-0001, EUJONTK-0002, EUJONTK-0003, EUJONTK-0004, EUJONTK-0005, EUJONTK-0006, EUJONTK-0007, and EUJONTK-0008.

At 40 CFR 60.110b(b), the following volatile organic liquid storage tanks constructed after July 23, 1984 are subject to NSPS Kb: (i) those with capacity of 151 cubic meters or greater (about 40,000 gallons) storing a liquid with a vapor pressure of 3.5 kilopascals or greater, or; (ii) those with capacity of 75 cubic meters or greater (about 20,000 gallons) storing a liquid with a vapor pressure of 15.0 kilopascals or greater. From Appendix F of the permit application for PTI 113-07, only EUJONTK-0004 meets the criteria (e.g. it has a capacity of 80,000 gallons and stores a liquid with vapor pressure of 5.8 kilopascals). Under 60.110b(a), (b), and (c) of the pre-10/15/2003 requirements of NSPS Kb, tanks greater than 40 cubic meters (about 10,500 gallons) that were not subject to control standards were still subject to the recordkeeping standards at 60.116b(b) and (c). With the 10/15/2003 revision to the standard the formerly "recordkeeping only" subject tanks are no longer subject to the standard at all. Excepting EUJONTK-0004, all of the tanks are reported to store liquids with vapor pressures less than 1.1 kilopascals. Although SCs 1.2 and 1.5 infer that these tanks are subject to the recordkeeping provisions of NSPS Kb the known information about these tanks determine otherwise. BASF complies with 60.112b(a) by operating EUJONTK-0004 with a closed vent system that exhausts through the RTO (60.112b(a)(3)).

FG-EMULSIONS, SCs 2.1, 2.2 – **COMPLIANCE** – Production of emulsion polymer limited to 241,000,000 pounds per 12-month rolling time period; records – Monthly and 12-month rolling total production records of emulsion polymer are provided for the period March 2013 through March 2015 in the May 1, 2015 submittal. Each 12-month total is less than 241,000,000 pounds. BASF claims this data as "Confidential Business Information". In the 2014 MAERS, BASF reports 83,140 tons (166,280,000 pounds) of product through RGJonEmulsions.

FG-SGO, SCs 3.1a, 3.6, 3.7, 3.13 – **COMPLIANCE** – Particulate emissions from the grinder not to exceed 0.10 pounds per thousand pounds of exhaust gases; test upon request of AQD; fabric filter F-1091 installed and operating properly, including the operation of the filter within the proper pressure drop operating range; pressure drop measured and recorded on a daily basis – A test has not been requested by AQD. The daily pressure drop records for March 2015 are provided in the May 1, 2015 submittal. The fabric filter operating procedures were previously provided in the September 25, 2013 information submittal and indicate a pressure drop range of 1 to 7 psi. The pressure drop measures in March 2015 range from 2.8 psi to 5.1 psi.

FG-SGO, SCs 3.1b, 3.3, 3.4, 3.5, 3.9, 3.11, 3.12 – **NOT APPLICABLE** – BASF's permit application anticipated the production of polystyrene in the solid/liquid grade resin reactors. Therefore, PTI 113-07 was issued with conditions incorporated from NSPS DDD, Rule 628 (by Rule 702(d)) and Rule 631 (by Rule 702(d)) applicable to the production of polystyrene. According to the May 1, 2015 information submittal and previous submittals, polystyrene has not been produced in the FG-SGO reactor trains as defined by Subpart DDD. These permit conditions apply to the facility only under polystyrene production.

FG-SGO, SCs 3.2, 3.8, 3.10 – **COMPLIANCE** – Production of solid/liquid grade resin limited to 142,000,000 pounds per 12-month rolling time period; records – Monthly and 12-month rolling total production records of solid/liquid grade resin are provided for the period March 2013 through March 2015 in the May 1, 2015 submittal. Each 12-month total is less than 142,000,000 pounds. BASF claims this data as "Confidential Business Information". In the 2014 MAERS, BASF reports 42,133 tons (84,266,000 pounds) of product through RGJonResins.

FG-RESINCUT, SCs 4.1, 4.2 – **COMPLIANCE** – Production of cut resin limited to 143,000,000 pounds per 12-month rolling time period; records – Monthly and 12-month rolling total production records of cut resin are provided for the period March 2013 through March 2015 in the May 1, 2015 submittal. Each 12-month total is less than 143,000,000 pounds. BASF claims this data as "Confidential Business Information". In the 2014 MAERS, BASF reports 49,861 tons (99,722,000 pounds) of product through RGJonResinCut.

FG-PRODUCTS, SCs 5.1a, 5.4, 5.6 – **COMPLIANCE** – Ethyl acrylate from FG-PRODUCTS equipment not vented to the RTO limited to 0.0144 pounds per hour; test upon request of AQD; throughput records and other records maintained as necessary to determine compliance with limit, which may be prorated from monthly records to an hourly rate – A test has not been requested by AQD. Prorated pound per hour ethyl acrylate emissions data is provided in the May 1, 2015 submittal for each month in the period March 2013 through March 2015. Each monthly pound per hour ethyl acrylate emission rate is less than 0.0144. BASF claims this data as "Confidential Business Information".

FG-PRODUCTS, SCs 5.1b, 5.2, 5.3, and 5.5 – **COMPLIANCE** – Particulate emissions from FG-PRODSILOS not to exceed 0.10 pounds per thousand pounds of exhaust gases; test upon request of AQD; fabric filter F-1091 installed and operating properly, including the operation of the filter within the proper pressure drop operating range; pressure drop measured and recorded on a daily basis – Please see discussion for fabric filter F-1091 under FG-SGO.

FG-PRODUCTS, SC 5.7 – **UNDETERMINED** – The stack for FG-PRODUCTS shall discharge unobstructed vertically and not have a diameter greater than 24 inches or a discharge height less than 58 feet – During the inspection a stack that meets these requirements is installed near the entrance to the main process building. It was not verified if this stack is associated with FG-PRODUCTS.

FG-DRUMMING, SCs 6.1a, 6.3, and 6.4 – **COMPLIANCE** – Ethyl acrylate from FG-DRUMMING equipment not vented to the RTO limited to 0.0144 pounds per hour; test upon request of AQD; throughput records and other records maintained as necessary to determine compliance with limit, which may be prorated from monthly records to an hourly rate – A test has not been requested by AQD. Prorated pound per hour ethyl acrylate emissions data is provided in the May 1, 2015 submittal for each month in the period March 2013 through March

2015. Each monthly pound per hour ethyl acrylate emission rate is less than 0.0144. BASF claims this data as "Confidential Business Information".

FG-DRUMMING, SCs 6.2, 6.5 – **COMPLIANCE** – Loading of organic compounds with a vapor pressure greater than 1.5 psia limited to 5,000,000 gallons per 12-month rolling time period; records – Monthly and 12-month rolling total loading records are provided for the period March 2013 through March 2015 in the May 1, 2015 submittal. Each 12-month total is less than 5,000,000 gallons. BASF claims this data as "Confidential Business Information".

FG-DRUMMING, SC 6.6 – **UNDETERMINED** – The stack for FG-DRUMMING shall discharge unobstructed vertically and not have a diameter greater than 24 inches or a discharge height less than 42 feet – The stack was not observed during the April 1, 2015 inspection.

FG-RTO, SCs 7.1a, 7.6 – **COMPLIANCE** – Ethyl acrylate emissions limited to 0.21 pounds per hour; test required – A performance test was conducted on April 23, 2010. On June 23, 2010, AQD received BASF's test report with a letter dated June 22, 2010. BASF reports the ethyl acrylate emission rate was less than the minimum detection limit of 0.009 pound per hour, and therefore in compliance with the SC 7.1a emission limit of 0.21 pounds per hour. Please see report B435912836.

FG-RTO, SCs 7.2, 7.7, 7.9, 7.10 – **COMPLIANCE** – An operating plan to be submitted pursuant to 60.113b(c)(1) to be submitted; facility to monitor the closed vent system and RTO in accordance with the operating plan; maintain a copy of operating plan and records of monitoring conducted for compliance with the operating plan.

AQD received the operating plan from BASF on July 26, 2007. The operating plan is required under NSPS Kb for the affected storage tank EUJONTK-0004. Please see report B435901112. Pursuant to 60.113b(c)(1)(i), flow and VOC constituent loading rates are provided and manufacturer's design specifications are given. The operating plan is to document the control device will meet the minimum destruction efficiency of 95% required under 60.112b(a)(3)(ii). Meeting a minimum residence time of 0.75 seconds and a minimum temperature of 816°C (1500°F) presumes compliance with the destruction efficiency without the necessity of a compliance test.

According to BASF, the RTO manufacturer specifies an average residence time of 0.93 seconds, a minimum combustion temperature of 790°C (1454°F), a maximum combustion temperature of 980°C (1796°F), and a destruction efficiency of 99%. The manufacturer's average residence time exceeds the minimum required, although a manufacturer's minimum is not provided. The manufacturer's minimum temperature does not meet the required presumptive minimum in the NSPS. Regardless, the specifications in the operating plan were accepted because of the performance test to be conducted (for the permit) to verify the destruction efficiency, which would provide superior documentation to the presumptive compliance method allowed by the regulation.

Pursuant to 60.113b(c)(1)(ii) BASF indicates the RTO system will be equipped with inlet, outlet, and combustion chamber temperatures monitors, airflow monitors, and burner flame management monitors. These monitors were to be observed during the performance test to determine appropriate parametric monitoring ranges for continued compliance.

The performance test conducted on April 23, 2010 demonstrated a destruction efficiency of 98%. The firebox temperature averaged 1557°F across the test. SC 7.3 sets the minimum 3-hour average firebox temperature to 50°F less than the average exhibited during a compliant performance test: the 3-hour minimum average is therefore 1507°F. Thus, in addition to the test result, the presumptive minimum of the NSPS Kb is met.

FG-RTO, SCs 7.3, 7.4, 7.6, 7.8, 7.11, 7.12 – **COMPLIANCE** – Equipment vented to the RTO shall not be operated unless the RTO is installed, maintained, and operated in a satisfactory manner, including maintaining a 3-hour average temperature not less than 50°F less than the average during a performance test where a TOC (minus methane and ethane) destruction efficiency of 98% is demonstrated; TOC destruction efficiency performance test required and reported to AQD; continuously monitor and record firebox temperature; record time periods when the 3-hour average is below the minimum; regular inspections to be performed to determine operating status of RTO and process emissions to oxidizer to be discontinued within one hour in the event of an RTO malfunction; temperature monitor to be calibrated.

The TOC destruction efficiency test was conducted on April 23, 2010. On June 23, 2010, AQD received BASF's test report with a letter dated June 22, 2010. BASF reports the average total hydrocarbon (minus methane and

ethane) destruction efficiency at 98%, and therefore in compliance with the SC 7.3 destruction efficiency standard of 98%. AQD and BASF agree the firebox temperature averaged 1557°F across the test and therefore the 3-hour minimum average is 1507°F; please see report B435912836 and submittal of September 26, 2011.

In the May 1, 2015 submittal, BASF supplies the 3-hour averages, calculated each hour, for the 24-hour day for April 28, 2015. The lowest 3-hour average recorded is 1600°F; from the continuous graph, the lowest instantaneous temperature recorded is about 1575°F. During the inspection on April 1, 2015, the RTO was observed to be operating with a temperature of 1607°F. BASF reports the RTO temperature has remained above the minimum during process operations (i.e. the RTO temperature may be less than the minimum during periods of process downtime) except during RTO malfunctions, when interlocks are activated to shut down the process within an hour (in accordance with SC 7.8c). As described below, under SC 7.5, the most recent malfunction of the RTO occurred on May 10, 2015.

The RTO was last inspected in September 11, 2014 by the manufacturer (Durr Environmental). The offline inspection report describes resin (particulate) buildup inside the RTO. The report recommended that the RTO have offline inspections conducted yearly to monitor particulate build-up within the unit.

FG-RTO, SC 7.5 – **NOT IN COMPLIANCE** – Shall not install bypass valves that could divert a vent stream from the RTO.

On November 5, 2009 AQD received a Rule 912 malfunction report dated November 3, 2009 from BASF indicating that from 21:33 on October 26, 2009 to 12:15 on October 27, 2009 the RTO at the Joncryl Polymers Plant shut down. During this period emission units which normally vent to the RTO vented uncontrolled to atmosphere through a bypass stack. According to BASF, the introduction of flammable liquids into the RTO risks a fire. The RTO manufacturer, Durr Environmental, has equipped the RTO with a knockout pot upstream of the combustion chambers to collect liquids entrained in the vent stream. A high liquid level in the knockout pot closes the inlet damper to the RTO to prevent liquids from entering the combustion chamber and directs flow to a bypass stack; the bypass and stack were provided by the manufacturer as a part of the RTO system. BASF speculated that on October 26, 2009 debris activated the high level switch in the knockout pot and caused the RTO to shut down. The alarm that was triggered was not observed until the morning of October 27, 2009 at which time process operations were gradually brought to a halt until the RTO was operational again at 12:15. From 21:33 on October 26 until process operations were halted on the morning of October 27, any vents that normally would pass through the RTO were blocked from doing so by the closure of the inlet damper and instead directed out an emergency bypass stack. BASF committed to redesign the alarm system to promote its visibility and to install an interlock to prevent the commencement of the process scale tanks when the RTO shuts down.

On May 14, 2012 AQD received an email notification from BASF of an RTO malfunction on May 10, 2012. BASF reports that from 03:54 on May 10, 2012 to 06:22 on May 10, 2012 the RTO shut down, except for a brief restart and subsequent return to shutdown status at 05:44. During this period all four of the emulsion trains and all four of the resin trains were in various stages of operation. Emissions exhausts from this equipment that occurred during this time frame, which normally vent to the RTO, were instead vented uncontrolled to atmosphere through the emergency bypass stack. According to BASF, the cause of the initial RTO malfunction at 03:54 was a high temperature reading in the unit. The RTO briefly restarted at 05:44 but a faulty valve positioner caused the unit to immediately shut down again. At 06:22 the RTO was restarted a second time and remained operational thereafter. At the time of the initial malfunction, interlocks within the process were activated so as to discontinue certain non-reactive processes, such as the filling of storage tanks, and so as to prohibit the commencement of any new production batches. Batches that were currently in production at the time of the RTO malfunction continued to run until their reactions were complete because of the unpredictable consequences of trying to halt a batch in mid-reaction.

SC 7.5 to PTI 113-07 states: "The permittee shall not install bypass valves that could divert a vent stream from the RTO." As a result of the installation of bypass valves prohibited under SC 7.5, the vents associated with FG-RTO did not pass through the RTO prior to exhaust during the malfunction events on October 26, 2009 to October 27, 2009 and on May 10, 2012; therefore, BASF is in violation of SC 7.5 of PTI 113-07. On January 5, 2010 and on May 21, 2012 AQD issued Violation Notices concerning these events.

BASF has informed the AQD that Durr Environmental supplied the emergency bypass stack as part of the purchase package of the RTO. As indicated above, certain inlet conditions present an explosion hazard to the RTO and the emergency bypass stack is provided to prevent a catastrophic failure of the system which may

harm the health of employees in the plant and the surrounding community. AQD does not dispute the necessity of the bypass stack. However, SC 7.5 does not provide for the installation of this device and therefore the PTI must be modified to allow for its operation.

At 8:56 AM on May 8, 2015 BASF notified the AQD that a fire occurred within the RTO on the night of May 7, 2015. According to BASF the fire was a result of deposited resin within the RTO along with introduction of excess oxygen. BASF described that vents were opened on the SGO lines that introduced excess oxygen to the RTO. According to BASF the RTO was not damaged by the fire, and the fire incident essentially acted as a RTO "bake out" where any built up particulate material was burned off. Prior to the fire, the plant was in a maintenance outage for 3 days. The RTO was back online and operating under normal condition on at 8 PM on May 8, 2015. At that time the plant was operating under normal operating conditions. During the time the RTO was "offline" production was not occurring and breathing losses from tanks and processes were vented through the RTO bypass stack. Mr. Thompson provided an email on June 29, 2015 that summarized the incident (see BASF B4359 correspondence file).

On June 10, 2015 BASF submitted a PTI application to modify PTI 113-07. Within the application requests that the language in PTI 113-07 be modified to allow tank and process breathing losses to be vented to atmosphere via the RTO emergency vent stack (i.e. without control) for RTO outages during offline inspections. BASF is considered to be in noncompliance with SC 7.5 until a new PTI is issued that resolves the language concerning the bypassing of the RTO during outage/offline inspections.

FG-RTO, SCs 7.13 through 7.16 – **NOT APPLICABLE** – Various notifications and records associated with NSPS DDD – BASF's permit application anticipated the production of polystyrene in the solid/liquid grade resin reactors which would qualify elements of the process as affected facilities under NSPS DDD. AQD received BASF's notice of the commencement of construction on July 26, 2007 and notice of initial startup on November 16, 2009. Please see reports B435901112 and B435908755. As of the May 1, 2015 inspection, BASF reports polystyrene has not yet been produced at the plant as defined in NSPS DDD (submittal of May 1, 2015) and there are no future plans to produce polystyrene. Therefore, future recordkeeping and reporting required by these conditions are not applicable unless polystyrene production commences.

Within the June 10, 2015 PTI application, BASF has requested that NSPS DDD conditions be removed from PTI 113-07.

FG-RTO, SC 7.17 – **COMPLIANCE** – The RTO stack shall discharge unobstructed vertically and not have a diameter greater than 24 inches or a discharge height less than 36 feet – Based on visual observations during the inspection on April 1, 2015, the stack is judged to be in compliance with these requirements, though measurements were not conducted.

FG-JONFACILITY, SCs 8.1, 8.3, 8.4 – **COMPLIANCE** – VOC emissions from the Joncryl plant not to exceed 36 tons per 12-month rolling time period; records maintained – Monthly and 12-month rolling total VOC emissions for the Joncryl plant are reported in the May 1, 2015 submittal for each month in the period March 2013 through March 2015. Each 12-month rolling total is less than 36 tons of VOC. BASF claims this data as "Confidential Business Information". In the 2014 MAERS, BASF reports 5,397 pounds (2.69 tons) of VOC were emitted from the various Joncryl Plant processes in calendar year 2014.

FG-JONFACILITY, SCs 8.2, 8.5 – **COMPLIANCE** – Implement and maintain a leak detection and repair (LDAR) program equivalent to Rule 628 with some alterations, including the submittal of semiannual (instead of quarterly) reports; records required.

The Joncryl plant is not subject to Rule 628, however, an LDAR program is necessary to provide a mechanism to quantify fugitive emissions; otherwise, a 12-month total for the plant cannot be obtained as needed to determine compliance with the 12-month rolling VOC limit. AQD and BASF agreed to model an LDAR program after an existing program (Rule 628) with some minor alterations. Rule 628 LDAR semiannual reports have been received on September 6, 2013, February 28, 2014, September 2, 2014, and March 4, 2015. Please see reports B435923187, B435924744, B435926772, and B435928812. The LDAR inspection summary report was provided in the May 11, 2015 submittal for April 2015.

**PTI 174-08, Wyandotte Resins, Warehouse Bagging Line**

Permit to Install No. 174-08 was issued June 30, 2008 was issued for the installation of a bagging line in a new warehouse constructed at the site.

EU-JONBagging, SCs I.1, IV.1, IV.2, V.1, VI.1 – **COMPLIANCE** – Particulate emissions from the bagging line not to exceed 0.10 pounds per thousand pounds of exhaust gases; test upon request of AQD; baghouse installed and operating properly, including the operation of the baghouse within the proper pressure drop operating range; pressure drop measured and recorded on a daily basis – A test has not been requested by AQD. The bagging line was not observed during the April 1, 2015 inspection. The pressure drop is recorded each day of operation. Records for February 16, 2015 through March 28, 2015 were provided. Operation records indicate that pressure drop should be between 1.0 and 4.5 inches of water. The provided records demonstrate that the pressure drop has been maintained within the specified range.

EU-JONBagging, SC VII.1 – **COMPLIANCE** – AQD to be notified of completion of installation within 30 days – On January 20, 2010 AQD received written notice from BASF dated January 11, 2010 that the installation of the bagging line was completed December 17, 2009.

EU-JONBagging, SC VIII.1 – **COMPLIANCE** – The bagging line exhaust stack shall discharge unobstructed vertically and not have a diameter greater than 18 inches or a discharge height less than 40 feet – Based on visual observations during previous site inspections, the stack is judged to be in compliance with these requirements, though measurements have not been collected.

**Fire Pumps and Emergency Generators**

BASF operates three diesel fire pump engines (575 horse power [hp]) and two natural gas emergency generators (30 KW and 100KW). Information on the fire pumps and generators was provided in the May 11, 2015 submittal. The fire pumps and emergency generators are both exempt from PTI requirements under the following Rule.

R336.1285(g): "Permit to install does not apply to...Internal combustion engines that have less than 10,000,000 Btu/hour maximum heat input."

Using engine specification data provided in the May 1, 2015 submittal, the calculated heat input for each fire pump is 5,069,000 Btu/hour (fuel consumption [37 gal/hour] x diesel fuel heating value [137,000 Btu/gal]).

The largest emergency generator operates at 100 KW/hr. Based on calculations, the 100 KW/hr power output rating is equivalent to 341,214.2 Btu/hr rated input. At a 25% efficiency conversion, the maximum converted rating is approximately 1,364,856 Btu/hr. Based on the calculated rating, the 100 KW and 30 KW emergency generators generator are exempt from PTI requirements.

40 CFR Part 60, Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines – **NOT APPLICABLE** – The diesel fire pump engines are not subject to this regulation as they were manufactured prior to 2009 (§60.4200(a)(1)(ii)), and Table 3).

40 CFR Part 60, Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines – The 30 kilowatt (KW) "PBX Gen" (see May 11, 2015 submittal) natural gas emergency generator is not subject to this regulation it was installed prior to June 12, 2006 (§60.4230(a)(4)).

The 100KW "IS Backup Gen" is subject to Subpart JJJJ, as the generator was manufactured in October 2014 and installed in February 2015 (see May 11, 2015 submittal).

- §60.4233(f)(4) - Owner/operator must comply with emission standards specified in this subpart. **NOT DETERMINED**. The 100 KW engine is required to meet the emission standards in the subpart within 1 year of engine startup (§60.4243(a)(2)(ii)). Based on the installation date, BASF has until February 2016 to conduct an initial performance test. The make and model (Olympian, G100694) was not identified in the USEPA engine certification database (http://www.epa.gov/otaq/certdata.htm).
- §60.4237(b) - Install a non-resettable hour meter. **UNKNOWN**. During the inspection, the verification of a non-resettable hour meter was not verified.

- §60.4243(d). Limit maintenance checks and readiness testing to 100 hours per year. **IN COMPLIANCE.** The May 11, 2015 submittal indicates that the generator is new and has not been operated. The facility reports 80.9 hours of operation on rented generators during 2014.

40 CFR Part 63, Subpart ZZZZ - National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (RICE) – The emergency generators and fire pumps were evaluated for applicable conditions of Subpart ZZZZ as outlined below. However, the applicable conditions were not evaluated for compliance during the inspection, but are included below for reference.

Firewater Pump #3 (Installed February 1991, 575 hp, compression ignition [CI]) – **NOT APPLICABLE** - Firewater Pump #3 is not subject to the Subpart ZZZZ as the engine meets the definition of an "existing stationary RICE" and §63.6590(b)(3).

Firewater Pump #1 (Installed February 2003, 575 hp, CI) and #2 (Installed May 2003, 575 hp, CI) – Both Firewater Pump #1 and #2 are considered a "new stationary RICE" as defined under §63.6590(a)(2)(i). The engines were installed prior to the issuance of PTI 289-05 (HAP synthetic minor permit) and therefore the engines are considered to be installed at a major source.

- §63.6590(b)(1)(i))– shall not be contractually obligated to be available for more than 15 hours per calendar year.
- §63.6645(c) – must submit an Initial Notification not later than 120 days after becoming subject to this subpart.

PBX Gen (Installed January 1992, 30 KW, Spark Ignition [SI]) – PBX Gen is considered an "existing stationary RICE" as defined under §63.6590(a)(2)(ii). The engine was installed prior to the issuance of PTI 289-05 (HAP synthetic minor permit) and therefore the engine is considered to be installed at a major source.

- §63.6595(a)(1) – must comply with applicable emission limitations and operating limitations in Subpart ZZZZ no later than August 16, 2004.
- §63.6625(e) – must operate and maintain the stationary RICE and after-treatment control device (if any) according to the manufacturer's emission related instructions or develop your own maintenance plan.
- §63.6625(h) – must minimize the engine's time spent at idle during startup and minimize the engine's startup time to period needed for appropriate and safe loading.
- §63.6640(a) – must demonstrate continuous compliance with operating limitations in Table 2c.
  - Table 2c – 6. a. Change oil and filter every 500 hours of operation or annually.
  - Table 2c – 6. b. Inspect spark plugs every 1,000 hours of operation or annually.
  - Table 2c – 6. c. Inspect all hoses and belts every 500 hours operation or annually.
- §63.6640(f) – Operation other than emergency operation, maintenance, and testing shall not exceed 50 hours per year.
- §63.6655(d),(e), and (f) – must maintain records of maintenance, and records of hours of operation.

IS Back up Gen (Installed February 2015, 100 KW, SI) – IS Back up Gen is considered a "new stationary RICE" as defined under §63.6590(a)(2)(iii). The engine was installed after the issuance of PTI 289-05 (HAP synthetic minor permit) and therefore the engine is considered to be installed at an area source.

- §63.6590(c) – Must meet the requirements of 40 CFR Part 60, Subpart JJJJ.

NESHAP for Chemical Manufacturing Area Sources, 40 CFR Subparts A and VVVVVV
On May 28, 2013, the AQD received from BASF Corporation, dated May 21, 2013, an Initial Notice of Compliance Status report for Chemical Manufacturing Area Source MACT at 40 CFR 63 Subpart VVVVVV. Please see B435923198. According to BASF, MACT VVVVVV applies to certain equipment at the ACCE plant associated with the EUCHEHARDELEN and EUCHEORGACT emission units. Currently, the AQD does not have delegation from the U.S. EPA to enforce MACT VVVVVV.

**Conclusion**
At the completion of this investigation the facility, though in compliance with the majority, is not in compliance with all of its applicable requirements. As previously determined during inspections in 2013 and 2011, an emergency bypass stack is installed prior to the regenerative thermal oxidizer (RTO) at the WYR in contravention of SC 7.5 of Permit to Install No. 113-07; the AQD Violation Notices dated January 5, 2010 and

May 21, 2012 concerning the installation of the bypass stack remain unresolved. BASF is considered to be in noncompliance with SC 7.5 until a new PTI is issued that resolves the language concerning the bypassing of the RTO during outage/offline inspections.

NAME _____ DATE 9/14/15 SUPERVISOR JK