B4359
Manila

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

B435938420

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:** 12/06/2016
STAFF: Todd Zynda	**COMPLIANCE STATUS:** Non Compliance	**SOURCE CLASS:** MAJOR
SUBJECT: Scheduled Inspection		
RESOLVED COMPLAINTS:		

REASON FOR INSPECTION: Scheduled Inspection
INSPECTED BY: Todd Zynda, AQD
PERSONNEL PRESENT: Bryan Hughes, EHS Team Leader; Jordan Thompson, Senior EHS Specialist; Tom Wharton, EHS Specialist; Jeff Truman, Polyol Plant Operational Engineer; David Fogle, TPU/Polyol Plant EHS Specialist; Mark Waldrop, CER Senior Scientist; Todd Francis, CER Research Engineer; R. Duane Hoagland, Wyandotte Resins Technical and Engineering Manager; Ed Kachadoorian, Site Utilities 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. From 2006 through November 2016 BASF purchased steam from a nearby utility (Wyandotte Power). As December 1, BASF began load sharing with Wyandotte Power, with the eventual goal for BASF to be completely off Wyandotte Power steam. Natural gas fired and diesel fired generators and a groundwater treatment system are also included in this group.

OUTSTANDING VIOLATIONS

On July 1, 2016 BASF was issued a violation notice for failing to verify and quantify ethyl acrylate emission rate and total organic carbon destruction efficiency (for FG-RTO at WYR) within 180 days after PTI 113-07A issuance. Stack testing was completed on December 6, 2016 (discussion is found below in this report). Following the AQD receiving the stack test report, this violation will be considered resolved.

INSPECTION NARRATIVE

On December 6 and 7, 2016 and January 17, 2017 the Michigan Department of Environmental Quality (MDEQ) Air Quality Division (AQD) inspector, Mr. Todd Zynda, conducted an 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, 113-07A, 174-08A, 143-09, and 80-11.

On December 6, 2016 at approximately 11:00 AM, Mr. Todd Zynda (AQD) arrived onsite. 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 11:10 AM Mr. Zynda entered the facility and was greeted by Mr. Brian Hughes. Prior to the inspection a visitor pass was obtained at the administration building.

The December 6, 2016 inspection of the WYR was conducted in conjunction with WYR FG-RTO stack testing. On December 7, 2016 Steam Facility and Ancillary Operations, CER, and the Polyol Manufacturing Plant was inspected. On January 17, 2017, an inspection of TPU Synthesis Manufacturing Unit was conducted in conjunction with the BASF Plastics Plants (M4777). Records were provided via email on February 10, 15, and 28, and March 24 and 31, 2017.

Steam Facility and Ancillary Operations

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.

The steam generating facility was visited on December 7, 2016. During the inspection, Mr. Ed Kachadoorian, Site Utilities Manager provided a tour of the plant. The steam generating facility comprises four natural gas-fired boilers each with a rated heat input capacity of 49.9 MMBtu per hour. The boilers were recently retrofitted with low-NOx burners. The boilers no longer have the capability to combust #6 fuel oil. The fuel oil lines have been removed or capped. According to Mr. Kachadoorian, the boilers were tuned during the week of November 28th, 2016 and the facility began load sharing with Wyandotte Power on December 1, 2016. As part of the steam

plant upgrade, a new water treatment system was installed. Previously the facility used deionized water, and now have changed to reverse osmosis treatment. During the inspection three of the four boilers were operating.

	Steam Flow (lb/hr)	Gas Flow Rate (scfh)
Boiler #1	Not Operating	
Boiler #2	6,903	7,575
Boiler #3	20,382	23,362
Boiler #4	16,456	21,364

On August 23, 2016, BASF provided documentation regarding the Steam Plant upgrade (see attached "Permit to Install Exemption Applicability Demonstration Pursuant to Rule 278a"), which included a Rule 278a analysis. Further evaluation of the Rule 278a analysis is required. An email was sent to BASF on April 18, 2017 requesting additional information of the below items.

- Manufacturer's information indicating the burners cannot burn fuel oil.
- Information regarding the physical restrictions of the boiler feed water systems. The AQD requested documentation of physical restrictions (pumps, piping, boiler capacity, etc) that supports that no more than 3 boilers can operate at once. If four boilers can operate concurrently, the total PTE may be over significant emission rates.
- Information on the emission guarantee listed in Table 2-1 (how will BASF demonstrate emissions are meeting the listed guarantee going forward).

According to the documentation provided, the steam plant upgrade project is $10,000,000. The fixed capital cost for entirely new steam plant was estimated at $31,000,000. While not provided on an individual emission unit basis, it can be assumed that the upgrade for each emission unit (boiler 1 through 4) does not constitute a reconstruction per Rule 118(b).

During the inspection of December 7, 2016, Mr. Thompson notified the AQD that an emergency generator was installed at the Steam Plant. The generator is located on north side of the steam plant (between the steam plant and Kreelon Building). The generator was not observed at this time due to new concrete pavement activities surrounding the generator.

During the inspection of December 7, 2016, "IS Backup Gen" and "PBX Gen" were observed.

During the inspection on January 17, 2017, the location of the three diesel fire pump engines was 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 steam plant generator was observed.

The groundwater treatment system building was also observed during the inspection. According to Mr. Wharton, the system will be operating for the foreseeable future.

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 December 7, 2016 from approximately 8:30 AM to 10:30 AM. During the inspection, Mr. Jeff Truman, Polyol Plant Operational Engineer 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. 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. Truman, reactor train number 7 has not been in operation since the mid-2000's 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 76 gallons per minute and pH readings of 12.8 and 13.6. A water scrubber (T-408) controls emissions from various ancillary vents at the conventional side of the process; the water flowrate measured 143 gallons per minute. The thermal oxidizer combustion temperature gauges read 1817°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.

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.

During the inspection the Polyols plant maintenance area cold cleaner was not observed. The previous inspection indicates that the cold cleaner is equipped with posted instructions and a mechanically assisted lid.

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 December 7, 2016. During the inspection, Mr. Mark Waldrop, Senior Scientist, and Mr. Todd Francis, Research 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 utilized for either 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 0.96 bar. According to previous inspections, an alarm sounds at 2 bar and the pH is sampled monthly. The operations log entry for December 4, 2016 showed a scrubber water concentration of 86.8% and a pH of 1.82. The north/south vacuum jet was in operation at the time of the inspection and registered a temperature of 20.9°C (or 69.6°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, emission unit EUMARS7 was observed. EUMARS7 was installed in 2012. 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 facility reports emissions per Rule 290.

During the inspection, the organic activator (PTI 80-11) was discussed. According to Mr. Francis, the organic activator has not been produced since 2012. The facility began producing a hexane based catalyst using the organic activator equipment in September 2016. According to Mr. Thompson, the facility completed a Rule 285 analysis for the change. BASF asserts that the change does is not a "meaningful change" and did not require a PTI application. According to Mr. Francis, the new process uses the glass lined reactors with some modification. Potential emissions are from product filling, heat up operation emissions, and from the decanter tank (hexane water, hexane is returned to the reactor). According to Mr. Francis, the exhaust gas temperature is not monitored as specified by PTI 80-11, SC II.1 and VI.1. According to Mr. Thompson, the primary condenser system (E802)is used, but not the secondary condenser (E801) which is the condenser cooled with glycol and required temperature monitoring (see email correspondence dated March 31, 2017). According to Mr. Thompson, it is unknown whether the hexane based catalyst will be continued to be produced after April 2017. BASF is currently evaluating other facilities to produce product.

According to previous inspections, the Poly-THF (EUCHEPOLYTHF) has not been produced in over 15 years. According to Mr. Francis, a new product named R62, is slated to be manufactured at the former Poly-THF location. This is currently in the planning stages.

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 January 17, 2017. During inspection of the TPU plant, Mr. Dave Fogle, TPU/Polyol Plant EHS Specialist 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. The sleeves on MDI storage tanks 1104 and 1105 were inspected and observed to be 95% brown, indicating that the carbon was in need of replacement. According to Mr. Fogle, the carbon was slated to be replaced within the month.

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 1.18 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 43 gallons per minute and 39 gallons per minute in the respective stages at 2:34 PM; the newer Line 2 registered a flow of 147 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. Fogle, the burnoff oven is operated weekly. During the inspection, the oven control screen indicated there was an error with the unit. Mr. Fogle stated that maintenance activities will be scheduled to address the oven error notification.

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 January 17, 2017 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.

On December 6, 2016, a stack test was conducted on the RTO. An inspection of WYR was conducted in conjunction with stack test observation.

WYR Stack Test Observation

Mr. Todd Zynda and Mr. Tom Maza of the AQD arrived at approximately 11:45 AM on December 6, 2016 for observation of stack testing of the RTO. Testing was conducted to verify the ethyl acrylate emission rate and total organic compounds (TOC) destruction efficiency. PTI 113-07A includes an ethyl acrylate limit of 0.21 pph (SC I.1) and TOC destruction efficiency of 98% by weight.

The ethyl acrylate emission rate was included in PTI 113-07A for compliance with the State air toxics Rule 225. The 98% destruction efficiency covers numerous requirements, including Rule 225, State Rule 702(a) requiring best available control for new VOC sources, and the NSPS Kb for VOC storage tanks. PTI 113-07 previously contained NSPS DDD requirements for VOC emissions from the polymer manufacturing industry. NSPS DDD requirements and citations were removed during the issuance of PTI 113-07A. PTI 113-07A, SC IV. 1 requires a 98% TOC (minus methane and ethane) destruction efficiency. NSPS Kb requires a 95% VOC destruction efficiency (40 CFR 60.112b(a)(3)(ii) and stipulates a test to demonstrate compliance if the oxidizer's minimum residence time is less than 0.75 seconds or its minimum temperature is less than 1500°F (40 CFR 60.113b(c)(1)(i)).

During the test the following were in operation: four SGO reactors trains; four emulsion reactor trains (one operating with ethyl acrylate); three SGO belt lines; the unloading of styrene from tanker car; and the loading of hazardous waste tanker truck (displacement is vented to RTO). During the first run of the test there was also a tanker truck unloading acrylic acid.

At 11:51 the RTO firebox temperature measured 1609 °F. At 2:04 PM the firebox temp measured 1598 °F. During the test ethyl acrylate emissions were noted as 0.125 pph (Run 1) and 0.137 pph (Run 2). The TOC destruction efficiency was noted as approximately 67% (VOC inlet at 750 ppm uncorrected, VOC outlet at 245 ppm uncorrected). No visible emissions were observed venting from the stack at any time during the test.

On February 9, 2017, the AQD received BASF's test report via email. BASF reports the average ethyl acrylate emission rate was 0.09 pph. BASF reports the average non-methane VOC destruction efficiency was 73.99%. Using the hourly combustion chamber temperatures provided in the BASF test report, from 11:00 AM to 4:00 PM on December 6, 2017 the average combustion temperature during the test was 1602.72°F. Combustion chamber temperatures were higher than the 3-hour minimum set during the initial performance test of April 23, 2010 (1507°F).

WYR Inspection

In conjunction with observation of the RTO stack test, an inspection of WYR was conducted on December 6, 2017. During the inspection, Mr. R. Duane Hoagland provided information and a tour of the facility. 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 WYR process building. During the inspection, the F-1091 stack did not meet PTI 113-07A requirements. The rectangular stack appeared to be approximately 15 inches by 20 inches and exhausted to ambient air at approximately 20 feet above ground surface.

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. 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. During the inspection, the drumming stack (SV-DRUM) did not appear to meet PTI 113-07A requirements. The stack did not discharge unobstructed vertically upwards (rain cap installed) and was approximately 8 inches in diameter and 35 feet above ground surface.

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. During the inspection on December 7, 2016, the

WYR tank farm was observed. The closed vent lines are painted yellow and vent to the RTO. It was verified that EUJONTK-0004 is equipped with a closed vent system that exhausts to the RTO.

The bagging line and warehouse (EUJONBAGGING, PTI 174-08A) at the southern end of the site was observed. During the inspection, the bagging line was not operation. The pressure drop for the baghouse on the bagging line read 2.1 inches water. The stack requirements appeared to be in compliance with PTI 174-08A.

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), 113-07A (issued September 14, 2015), 174-08A (issued January 11, 2016), 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 December 6 and 7, 2016 and January 17, 2017 the last site inspection was conducted on March 31, 2015 and April 1, 2015, with the last full compliance evaluation covering compliance activities reviewed through approximately April 1, 2015. In general, this report covers compliance activities that have occurred since April 2, 2015 through approximately January 17, 2017. Records were provided by BASF on February 10, 15, and 28, and March 24 and 31, 2017. 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 December 6 and 7, 2016 and January 17, 2017 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 December 6 and 7, 2016 and January 17, 2017 visible emissions were not observed.

GC 12 – **COMPLIANCE** – Nuisance emissions prohibited – No citizen complaints have 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 SC 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 August 30, 2016, March 9, 2016, and August 29, 2015. Please see MACES reports B435936383, B435933915, and B435931118.

GC 24 – **COMPLIANCE** – Submissions to the Emissions Inventory – The AQD received this facility's 2014 and 2015 MAERS databases on (or postmarked) March 16, 2015 and March 16, 2016.

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 December 2014 through December 2016 in the January 26, 2017 submittal for M4777. Monthly total HAP emissions range between 0.857 and 0.991 tons. Acrylic acid registered the highest total of any single HAP for a 12-month rolling period at 2.641 tons. BASF reported that the highest 12-month rolling total HAPs occurred at the end of December 2016 at 11.58 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 previous 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.

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. R336.1290 exempts from R336.1201 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 2015 MAERS with their reported annual emissions in pounds:

2015 MAERS emissions reported (in pounds)

Section	Emission Unit	VOC	PM10
1	EUSTENWORKGROUN	0.34	------
2	EUPOLGRAFTINDEX	351	------
2	EUPolSugarPent	Did not operate	
2	RGPOLTANKS	6,849	------
3	EUCheBlends	19	------
3	EUCheEpilmine	Did not operate	
3	EUCheGraftedPoly	3,345	------
3	EUCHEGRAFTINDEX	Did not operate	
3	EUCheHalfEster	11	------
3	EUCheMacromer	Did not operate	
3	EUCheNMP	3.8	------
3	EUCHEHardlen	2	------
4	EUTPUFURNACE	204	308
4	EUTPUSYNTHESIS	2,578.1	89

The emission unit EUTPUFURNACE is also reported to have emitted 679 pounds of CO, 317 pounds of NOx, and 21 pounds of SO2 during the 2015 calendar year. In addition, four Rule 290 emission units are listed as did not operate (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 email correspondence dated February 10 and 15, 2017, 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 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 2013 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 SDS for the cleaning solvent, "Extreme Simple Green Aircraft Precision Cleaner", is provided in the February 10, 2017 submittal and indicates the material is water based and does not contain the above listed compounds.

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.

During the inspection the Polyols plant maintenance area cold cleaner was not observed. The previous inspection indicates that the cold cleaner is equipped with posted instructions and a mechanically assisted lid. Therefore, the cold cleaner is judged in compliance with SC I.C.1 and VI.1. The vapor pressure of the solvent is reported at 20.7 mmHg (0.40 psia). Records provided indicate 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 February 10, 2017 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 previously shut down on March 15, 2006. Until December 2016, steam was received from the Wyandotte municipal power plant via an overland steam line. During the inspection on December 7, 2016, the steam plant was in operation as described above. The boilers were recently retrofitted with low-NOx burners. The boilers no longer have the capability to combust #6 fuel oil. The fuel oil lines have been removed or capped. Therefore conditions included under FGSTEFACILITY are not applicable.

On August 23, 2016, BASF provided documentation regarding the Steam Plant upgrade ("Permit to Install Exemption Applicability Demonstration Pursuant to Rule 278a"), which included a Rule 278a analysis. Further evaluation of the Rule 278a analysis is required. An email was sent to BASF on April 18, 2017 requesting additional information of the below items.

- Manufacturer's information indicating the burners cannot burn fuel oil.
- Information regarding the physical restrictions of the boiler feed water systems. The AQD requested documentation of physical restrictions (pumps, piping, boiler capacity, etc) that supports that no more

than 3 boilers can operate at once. If four boilers can operate concurrently, the total PTE may be over significant emission rates.

- Information on the emission guarantee listed in Table 2-1 (how will BASF demonstrate emissions are meeting the listed guarantee going forward).

According to the documentation provided, the steam plant upgrade project is $10,000,000. The fixed capital cost for entirely new steam plant was estimated at $31,000,000. While not provided on an individual emission unit basis, it can be assumed that the upgrade for each emission unit (boiler 1 through 4) does not constitute a reconstruction per Rule 118(b).

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) – SVPolMagSil7 is not used as reactor 7 has not been in use since the mid-2000's.

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 January 2015 through December 2016; each 12-month rolling total is less than 2,500 tons (March 24, 2017 submittal). BASF claims this data as "Confidential Business Information". In the 2015 MAERS, BASF reports 71 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 II.B.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 March 24, 2017 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 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 January 2015 through December 2016; each 12-month rolling total for PM is less than 1.0 ton (March 24, 2017 email submittal). BASF claims this data as "Confidential Business Information". In the 2015 MAERS, BASF reports aggregate PM emissions from EUPolConv at 335 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 the 2013 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 January 2015 through December 2016; 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 5.28 pounds. The 12-month rolling total for EO and PO is less than 0.13 tons and 0.02 tons, respectively (March 24, 2017 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 January 2015 through December 2016. As described by Mr. Truman during the inspection on December 7, 2016, reactor 7 has not been in operation. Therefore the monthly production for reactor 7 is zero for the last two years. The March 24, 2017 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 2015 MAERS, BASF reports 13,047 tons (26,094,000 pounds) of product through EUPOLConv and 13,047 tons (26,094,000 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 SC 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. Continuous thermal oxidizer temperatures for December 7, 2016 are provided in the February 10, 2017 submittal; the temperature measures fluctuate within a range from about 1805°F to about 1828°F. During the inspection on December 7, 2016 the thermal oxidizer temperature was observed operating within a range from 1817°F and 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 January 2015 through December 2016; each monthly total demonstrates compliance with the daily limit of 24 and each 12-month rolling total is less than 800 (March 24, 2017 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 December 7, 2016 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 December 7, 2016, a transfer was not observed. Non-confidential procedures for EO and PO transfers were received in the February 10, 2017 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.

Continuous water scrubber flowrates for December 7, 2017 is provided in the February 10, 2017 submittal; the flowrate measures within the range of about 126 to 149 gallons per minute. Water scrubber procedures were provided in the February 10, 2017 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 December 7, 2016 was provided in the February 10, 2017 submittal. From data provided it appears that the pressure drop continually registers 0.12 inches of water. 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 December 7, 2016.

The February 10, 2017 submittal also contained the dust collector maintenance records for F-410C and F-531.

During the inspection it was identified that there are two dust collectors, each stacked individually for reactors 8 and 9. Based on the maintenance records provided, it appears that F-531 services reactor #9 and F-410C services reactor #8. Noncompliance with stack conditions is cited above.

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 (April 1, 2015), pursuant to 63.1439(e)(6), MACT PPP semiannual reports have been received on August 25, 2016, March 9, 2016, and September 2015. Please see reports B435936375, B435933832, and B435931066.

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. Based on the inspection of December 7, 2016, SVPOL115 appears to be the vent located on TK-500 (styrene tank).

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 January 2015 through December 2016 (February 10, 2017 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 2015 MAERS, BASF reports the annual throughput of styrene at 1,899,000 gallons. At a density of about 7.56 pounds per gallon, this equates to

an annual throughput of 14,356,440 pounds styrene. Styrene emissions (combined working and breathing losses) are reported at 3.93 pounds. Within the 2015 MAERS submittal the facility uses a MAERS emission factor to report emissions and a control efficiency of 99%. Based on the records provided, the facility is determined to be in "compliance" with the emission limits. However, further evaluation of this emission unit and reported emissions needs to be completed.

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 January 2015 through December 2016; each 12-month rolling total shows compliance with the 150,000,000 pound limit (March 24, 2017 submittal). BASF claims this data as "Confidential Business Information". In the 2015 MAERS, BASF reports 13,047 tons (26,094,000 pounds) of product through EUPOLFugConv and 27,460 tons (54,920,000 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. Continuous thermal oxidizer temperatures for December 7, 2016 are provided in the February 10, 2017 submittal; the temperature measures fluctuate within a range from about 1805°F to about 1828°F. During the inspection on December 7, 2016 the thermal oxidizer temperature was observed operating within a range from 1817°F and 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 February 10, 2017 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 February 10, 2017 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 January 2015 through December 2016; each 12-month total is less than the 5,000,000 gallon limit. BASF claims this data as "Confidential Business Information". In the 2015 MAERS, BASF reports the annual throughput of TDI at 816,000 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 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 2015 MAERS, for RGPOLTANKS BASF lists combined working and breathing losses at 0.05 pounds TDI, with a control efficiency of 98%.

SC III.A.3.1, 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 February 10, 2017 submittal, indicate that the carbon canister was replaced on May 26, 2015 and May 26, 2016. During the December 7, 2017 inspection, the activated carbon canister installed on the top of TK-536 was observed. An indicator sleeve was not present.

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. Truman, 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 – **NOT IN 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.

BASF reports that on March 30, 2016 there was release of ethylene oxide to atmosphere from a PSV on TK-155 (see MACES report B435936383). According the summary, during a maintenance of TK101B (EO storage tank), where process water is sent to Oxide scrubber (TK-403D) and interconnected neutralization tank (TK-155), the system experienced an over pressurization resulting in the lifting of the PSV of TK-155. The total amount of the release is estimated at 460 lbs, with the PSV venting for approximately 89 seconds. Once the pressure build was noticed by operators, all production activities were halted and the tanks were allowed to cool and equilibrate overnight to mitigate the release. Once the PSV reseated, process vents were restored to their normal control device path (to the thermal oxidizer.

The release of 460 lbs of EO is a violation of MI-ROP-B4359-2003b, SC II. B.1.1. During a conversation with Mr. Jordon Thompson on March 20, 2017, the following was described regarding the EO release. The tank clearing of TK101B was conducted using past practices. The tank heel (EO left in the tank) was "mixed" with water, with the intention that EO and water will react to form ethylene glycol. The water and EO "mixture" was pumped to the scrubber as batches (the caustic pushes the EO to EG at a faster pace). It is believed that the water and EO

were stratified and during the 3rd batch to the scrubber. The system over pressurized. The thermal oxidizer, tripped (shutdown), due to too many BTU's being vented for thermal combustion. Therefore, over pressurization occurred, the PSV was lifted to and the EO was released. Mr. Thompson could not verify if other equipment (reactors, etc.) vented to the thermal oxidizer were in use. A violation notice will be issued for the EO release greater than 6.4 pph.

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 February 10, 2017 submittal lists monthly and 12-month rolling emissions for the period from January 2015 through December 2016; each 12-month total is less than the annual emissions limitation. BASF claims this data as "Confidential Business Information". In MAERS 2015, BASF reports emissions of 991 pounds (0.50 tons) VOC and 7780 pounds (3.89 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.

As described above in SC II.B.1.1, there was an EO release (460 lbs) on March 30, 2016. Compliance with §63.1425(b)(2)(i) through (iii) could not be verified. However, a violation notice will be issued for the EO release greater than 6.4 pph (MI-ROP-B4359-2003b, SC II. B.1.1).

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.

SC III.A.3.2.a and c, 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 February 10, 2017, BASF reports the last inspection and repairs of the oxidizer occurred on September 16, 2016. According to the inspection, "the lower combustion chamber is in need of extensive repair and should be planned for the next outage. The refractory lining is deteriorated (major cracking and spalling of refractory)". The inspection concludes that the "refractory lining needs to be addressed before failure occurs, which could cause a long un-planned outage."

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 (April 1, 2015), pursuant to 63.1439(e)(6), MACT PPP semiannual reports have been received on August 25, 2016, March 9, 2016, and September 2015. Please see reports B435936375, B435933832, and B435931066. These reports include summaries of MACT PPP LDAR activities. Rule 628 LDAR semiannual reports have been received on August 30, 2016, March 9, 2016, and September 1, 2015. Please see reports B435936382, B435933696, and B435931105.

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 III.A.3.1 – **COMPLIANCE** – HAP emissions are tracked and reported on the Wyandotte Site HAPs Summary. See SOURCE-WIDE conditions SC II.B.1.1 and 2.2, III.A.3.2 and 3 above.

SC III.A.3.2, III, IV. 4, and 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. According to Mr. Todd Francis, the facility is in the pre-planning phases to use the poly-THF equipment for manufacture of a TDI prepolymer. Mr. Thompson states that the facility will evaluate any changes using Rule 285 "meaningful change". An email was sent to BASF on April 18, 2017 requesting that BASF obtain a PTI for the change, or demonstrate prior to the change how BASF will comply with permit conditions.

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 February 10, 2017 submittal, BASF reports combined EO, PO, and VOC emissions of 450 pounds (0.225 tons) in the period from January 2015 through December 2016. It is assumed that the BO was not used in production (zero emissions). The summation of the emissions is significantly less than all individual emission limits. From MAERS 2015, annual emissions of VOC for the emission unit are reported at 128 pounds (0.064 tons); as EO and PO are classified as VOCs, the individual emissions for these pollutants are 128 pounds or less.

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 February 10, 2017 submittal, for the period January 2015 through December 2016 BASF's production logs document 26 total batches and total 233,845 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 February 10, 2017 submittal for December 7, 2016. Jet temperatures continually register less than 25°C (77°F). The north/south vacuum jet was in operation at the time of the inspection and registered a temperature of 20.9°C (or 69.62 °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 November 4, 2016 and December 4, 2016, and monthly production logs for November and December 2016 are included in the February 10, 2017 submittal. During the inspection on December 7, 2016, the oxide scrubber control panel in Building 55R showed a T-110 wet scrubber pump outlet pressure of 0.96 bar. According to the previous inspection, an alarm sounds at 2 bar and the pH is sampled monthly. The operations log entry for December 4, 2016 showed a scrubber water concentration of 86.8% and a pH of 1.82. Included in the February 10, 2017 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 November and December 2016 (February 10, 2017 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 February 10, 2017 submittal, BASF reports total magnesium silicate usage at 900 pounds in the period from January 2015 through December 2016.

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. From the information submittal of February 10, 2017, BASF reports no graft polyol was produced for commercial production during 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 used for commercial production.

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. During the inspection on December 7, 2016, BASF notified the AQD that facility began producing a hexane based catalyst (X-5400) using the organic activator equipment in September 2016. According to Mr. Thompson, the facility completed a Rule 285(b) analysis for the change. BASF asserts that the change does is not a "meaningful change" and did not require a PTI application. According to Mr. Francis, the new process uses the glass lined reactors with some modification. Potential emissions are from product filling, heat up operation emissions, and from the decanter tank (hexane water, hexane is returned to the reactor).

Within the February 15, 2017 submittal, BASF provided a Rule 285(b) analysis for X-5400. The Rule 285(b) analysis was not evaluated and is undetermined at this time.

SC I. 1 and SC VI. 5. **COMPLIANCE** – VOC emissions shall be less than 0.3 tpy on a 12-month rolling time period. The equipment at EUCHEORGACT has only operated since September 2016. The reported VOC emissions from the production of X-5400 from September 2016 to December 2016 is 129.84 pounds (0.06 tons).

At this time, the facility is in compliance with the VOC emission limit. The February 15, 2017 records submittal indicated VOC emissions at 204 pounds. According to Mr. Thompson, the emissions were revised as the process uses chilled water (constant temperature of approximately 5.5°C on E-802). The original submittal estimated emissions using river water (worst case 25°C).

SC II. 1, SC VI. 2. **COMPLIANCE** – Shall not process more than 36 batches of organic activator in EUCHEORGACT per 12-month rolling time period. The facility reports 12 batches of X-5400 between September 2016 and December 2016.

SC III. 1, SC IV.1, SC VI. 1. **NOT IN COMPLIANCE** – Shall not operate EUCHEORGACT unless the condenser system exhaust gas temperature is 35°F or less. Shall not operate EUCHEORGACT unless the condenser system is installed, maintained, and operated in a satisfactory manner. Exhaust gas temperature shall of condenser system shall be monitored on a continuous basis. The facility asserts that this condition is not applicable as the secondary condenser system (E-801) is not in use. However, under Rule 285(2)(b) a new PTI need not be obtained, but the current PTI and all conditions remain enforceable. The facility will be issued a violation for not monitoring the condenser system exhaust gas temperature.

SC VI. 3. **NOT EVALUATED** – Shall maintain a current list of materials used in EUCHEORGACT that are determined to be exempt from health-based screening level requirement of Rule 225. The list shall include the compound name and CAS number and a calculation demonstrating the emission rate of each material. The facility asserts that there are no materials emitted requiring a Rule 225 evaluation.

SC VI. 4. **COMPLIANCE**. Shall complete all required calculations in an acceptable format.

SC VIII. 1 and 2. **COMPLIANCE**. Stack conditions for EF-1 (36 inches maximum diameter, 72.9 feet above ground) and EF-2 (36 inches maximum diameter, 65.5 feet above ground). During the inspection the stacks appeared to meet these requirements. Measurements were not collected.

SC IX. **NOT APPLICABLE**. Shall comply with 40 CFR Part 63 Subpart A and VVVVVV. According to BASF's record submittal, CMAS is not subject to the new product manufactured using the EUCHEORGACT equipment. When the organic activator was produced at the facility, chloroform was used in the process and was

therefore subject to Subpart VVVVV. According to Mr. Thompson, the new process does not use any materials regulated by Subpart VVVVV.

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 113-07A, Wyandotte Resins (formerly Joncryl Polymers Plant)
Permit to Install No. 113-07A was issued September 14, 2015.

FG-RAWMATLS, SC II.1 and VI.1. **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 January 2015 through December 2016 in the February 10, 2017 submittal. Each 12-month total is less than 379,000 gallons. BASF claims this data as "Confidential Business Information".

FG-RAWMATLS, SC III.1, IV.1 and VI.2. **NOT IN 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 SC III. 1 infers that these tanks are subject to the recordkeeping provisions of NSPS Kb the known information about these tanks determine otherwise. As verified during the inspection on December 7, 2016, BASF complies with 60.112b(a) by operating EUJONTK-0004 with a closed vent system that exhausts through the RTO (60.112b(a)(3)).

As described above in the stack test observation summary, PTI 113-07A, SC IV. 1 requires a 98% TOC (minus methane and ethane) destruction efficiency, which is likely carryover from NSPS Subpart DDD (40 CFR 60.562-1(b)(1)(iii)) requirements. NSPS Kb requires a 95% VOC destruction efficiency (40 CFR 60.112b(a)(3)(ii) and stipulates a test to demonstrate compliance if the oxidizer's minimum residence time is less than 0.75 seconds or its minimum temperature is less than 1500°F (40 CFR 60.113b(c)(1)(i)).

On February 9, 2017, the AQD received BASF's test report via email. BASF reports the average non-methane VOC destruction efficiency was 73.99%. This is a violation of 40 CFR 60.112b(a)(3)(ii) and SC III.1.

FG-EMULSIONS, SC II. 1 and VI. 1. **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 January 2015 through December 2016 in the February 10, 2017 submittal. Each 12-month total is less than 241,000,000 pounds. BASF claims this data as "Confidential Business Information". In the 2015 MAERS, BASF reports 80,505 tons (161,010,000 pounds) of product through RGJonEmulsions.

FG-SGO, SC I.1, IV.1, IV.2, and VI.3. **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 December 2016 are provided in the February 10, 2017 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 December 2016 range from 3.0 psi to 3.6 psi.

FG-SGO, SC II.1, VI.1, and VI. 2. **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 January 2015 through December 2016 in the February 15, 2017 submittal. Each 12-month total is less than 142,000,000 pounds. BASF claims this data as "Confidential Business Information". In the 2015 MAERS, BASF reports 41,269 tons (82,538,000 pounds) of product through RGJonResins.

FG-RESINCUT, SC II.1 and VI. 1. **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 January 2015 through December 2016 in the February 10, 2017 submittal. Each 12-month total is less than 143,000,000 pounds. BASF claims this data as "Confidential Business Information". In the 2015 MAERS, BASF reports 48,950 tons (97,900,000 pounds) of product through RGJonResinCut.

FG-PRODUCTS, SC I.1 VI. 1, and VI. 3. **COMPLIANCE** – Ethyl acrylate from FG-PRODUCTS equipment not vented to the RTO limited to 0.0144 pounds per hour; throughput records and other records maintained as necessary to determine compliance with limit, which may be prorated from monthly records to an hourly rate – Prorated pound per hour ethyl acrylate emissions data is provided in the February 10, 2017 submittal for each month in the period January 2015 through December 2016. Each monthly pound per hour ethyl acrylate emission rate is less than 0.0144. BASF claims this data as "Confidential Business Information".

FG-PRODUCTS, SC I.2, IV.1, IV.2, and VI. 2. **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 VIII.1. **NOT IN COMPLIANCE** – 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, the F-1091 stack (SV-PROD) did not meet PTI 113-07A requirements. The rectangular stack appeared to be approximately 15 inches by 20 inches and exhausted to ambient air at approximately 20 feet above ground surface.

FG-DRUMMING, SC I.1, VI.1, and VI.2. **COMPLIANCE** – Ethyl acrylate from FG-DRUMMING equipment not vented to the RTO limited to 0.0144 pounds per hour; 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 January 2015 through December 2016. Each monthly pound per hour ethyl acrylate emission rate is less than 0.0144. BASF claims this data as "Confidential Business Information".

FG-DRUMMING, SC II.1, VI.3. **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 January 2015 through December 2016 in the February 15, 2017 submittal. Each 12-month total is less than 5,000,000 gallons. BASF claims this data as "Confidential Business Information".

FG-DRUMMING, SC VIII.1. **NOT IN COMPLIANCE** – 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. During the inspection, the drumming stack (SV-DRUM) did not appear to meet PTI 113-07A requirements. The stack did not discharge unobstructed vertically upwards (rain cap installed) and was approximately 8 inches in diameter and 35 feet above ground surface.

FG-RTO, SCs I.1 and SC V. 1. **COMPLIANCE** – Ethyl acrylate emissions limited to 0.21 pounds per hour; test required – A performance test was conducted on December 6, 2016. On June 23, 2010, AQD received BASF's test report on February 24, 2017. BASF reports the ethyl acrylate emission rate of 0.09 pound per hour, and therefore in compliance with the SC I.1 emission limit of 0.21 pounds per hour.

FG-RTO, SC III.1, VI.1, and VI.3. **COMPLIANCE PENDING** – An operating plan 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. At the time the operating plan was reviewed (B435901112), 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.

As described above under FG-RAWMATLS, the measured destruction efficiency during the December 6, 2016 stack test was 73.99%. The firebox temperature averaged 1603°F across the test. SC IV.1 sets the minimum 3-hour average firebox temperature to 50°F less than the average exhibited during a compliant performance test. However, since the test fails to demonstrate compliance with the NSPS Kb destruction efficiency, the 3-hour minimum average will be determined once compliance with the destruction efficiency is determined. While the operating plan has been submitted, the operation of the RTO does not the required destruction efficiency of 95%. Operational changes or upgrades to the control equipment need to be implemented to comply with the required destruction efficiency.

FG-RTO, SC IV.1, V.1, and VI.5. **NOT IN 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. On February 9, 2017, the AQD received BASF's test report via email. BASF reports the average non-methane VOC destruction efficiency was 73.99%.

FG-RTO, SC IV.2, VI. 2, VI. 4, VI.6. **COMPLIANCE.** 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.

In the February 10, 2017 submittal, BASF supplies the 3-hour averages, calculated each hour, for December 2016. The lowest 3-hour average recorded is 1579°F. During the inspection on December 6, 2016, the RTO was observed to be operating between 1598 and 1609°F. 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 June 9, 2016 by the manufacturer (Durr Environmental). The online inspection report describes resin (particulate) buildup inside the RTO. The report indicates that Durr engineering will review the particulate resin build up issues and send some recommendations to help reduce resin build up. Durr also recommended replacing the thrust bearing carrier at the next shutdown.

FG-RTO, SC IV.3 and IV.4, and VI. 7– **UNDETERMINED** – Shall not install bypass valves that could divert a vent stream from the RTO except as allowed by SC IV.4. During periods of shutdown of the RTO system for maintenance or offline inspections, the facility may vent storage tanks and process tanks breathing losses to atmosphere by way of the RTO emergency vent. During RTO shutdowns, the facility shall minimize uncontrolled emissions. SC IV.3 and IV.4 were added as part of issuance of PTI 113-07A. At this time, it has not verified if the facility is meeting the requirements of SC IV.4 during periods of shutdown. Records specified in SC VI.7 were not requested.

FG-RTO, SC VIII. 1 and 2. **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. The RTO bypass stack shall discharge unobstructed vertically and not have a diameter greater than 24 inches or a discharge height less than 27 feet. Based on visual observations during the stack test on December 6, 2016, the stack is judged to be in compliance with these requirements, though measurements were not conducted.

FG-JONFACILITY, SC I.1, VI.1, VI. 2. **COMPLIANCE** – VOC emissions from WYR not to exceed 36 tons per 12-month rolling time period; records maintained – Monthly and 12-month rolling total VOC emissions for the plant are reported in the February 15, 2017 submittal for each month in the period January 2015 through December 2016. Each 12-month rolling total is less than 36 tons of VOC. BASF claims this data as "Confidential Business Information". In the 2015 MAERS, BASF reports 5,051 pounds (2.53 tons) of VOC were emitted from the various WYR Plant processes in calendar year 2015.

Using the RTO destruction efficiency from the December 6, 2016 stack test (73.99%) and assuming a worst case scenario, that all emissions are controlled by the RTO, the AQD calculated emissions based using the recent destruction efficiency result. Facility emissions would still be less than 36 tons per year (2.53/X = 0.02/.26. X = 32.89 tons per year).

FG-JONFACILITY, SC III.1, 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 WYR 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 August 30, 2016, March 9, 2016, and September 1, 2015. Please see reports B435936382, B435933696, and B435931105.

PTI 174-08A, 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, SC 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. During the inspection on December 7, 2016 the bagging line was not operation. The pressure drop for the baghouse on the bagging line read 2.1 inches water. The pressure drop is recorded each day of operation. Records for December 2016 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 VIII.1 – **COMPLIANCE** – The bagging line exhaust stack shall discharge unobstructed vertically and not have a diameter greater than 18 inches by 18 inches or a discharge height less than 20 feet – Based on visual observations during the site inspection, the stack is judged to be in compliance with these requirements, though measurements have not been collected.

Fire Pumps and Emergency Generators

The facility operates three emergency generators (EUPBXGEN, EUISBACKUPGEN, and Steam Plant Generator) and three firewater pumps (ESTEFIREPUMP1, ESTEFIREPUMP2. ESTEFIREPUMP3). The three emergency generators are each of spark ignition design and operate using natural gas. The fire pumps are each of compression ignition design and operate using diesel fuel. 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 maximum heat input for each diesel fire pump is 5,069,000 Btu/hour (fuel consumption [37 gal/hour] x diesel fuel heating value [137,000 Btu/gal]).

The largest natural gas emergency generator operates at 250 KW/hr. Based on calculations provided via email, the 250 KW/hr power output rating is equivalent to 2,809,820 Btu/hr rated input (2782 cuft [max natural gas usage @ 100% duty] x 1010 btu/cuft = 2,809,820 Btu/hr). Based on the calculated rating, the 250KW, 100 KW and 30 KW emergency generators 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 NSPS for Stationary Spark Ignition Internal Combustion Engines is published at 40 CFR 60, Subparts A and JJJJ. Engines that commenced construction after June 12, 2006 are subject to the regulation. EUPBXGEN at the facility was installed January 1, 1992 and is therefore not subject to this regulation. EUISBACKUPGEN was installed on February 1, 2015 and is subject to this regulation. The Steam Plant Generator was installed sometime in late 2016 (specific date has not been provided) is also subject to this regulation.

§60.4233(d) and §60.4233(e), 40 CFR Part 60, Subpart JJJJ, Table 1 - Owner/operator must comply with emission standards specified in this subpart. **COMPLIANCE**. The facility provided a USEPA Certificate of Conformity for both engines subject to this rule.

§60.4237(b) - Install a non-resettable hour meter. **COMPLIANCE**. During the inspection, the verification of a non -resettable hour meter was verified on both subject units.

§60.4243(d). Limit maintenance checks and readiness testing to 100 hours per year. **COMPLIANCE**. The March 24, 2017 submittal indicates that EUISBACKGEN is in compliance with this requirement. The Steam Plant Generator is new as of late 2016.
40 CFR Part 63, Subpart ZZZZ - National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (RICE)

The MACT for Stationary Reciprocating Internal Combustion Engines is published at 40 CFR 63, Subparts A and ZZZZ. MACT ZZZZ was promulgated June 15, 2004. The group of three BASF stationary sources obtained the enforceable permit limitations to become an area source for HAPs on February 7, 2006. The opt out permit was obtained prior to the compliance deadlines of May 3, 2013 and October 19, 2013 (§63.6595(a)). Therefore the stationary source B4359 is considered an area source for the applicability of MACT ZZZZ. EUSTEFIREPUMP1, EUSTEFIREPUMP2, EUSTEFIREPUMP3, and EUPBXGEN are subject to MACT ZZZZ. Per 40 CFR 63.6590 (c) and (c)(1), EUISBACKUPGEN and the Steam Plant Generator need only comply with the requirements of NSPS JJJJ in order to satisfy the requirements of MACT ZZZZ. New affected sources under MACT ZZZZ are engines wherein construction commenced on or after June 12, 2006 (40 CFR 63.6590(a)(2)(iii)). The MDEQ AQD is not the delegated authority for this regulation. Therefore applicable conditions of Subpart ZZZZ were not evaluated.

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. The AQD accepted delegation of Subpart VVVVVV through R 336.1902 and R 336.1960.

As described above under EUCHEORGACT, according to BASF's record submittal, Subpart VVVVVV is not subject to the new product manufactured using the EUCHEORGACT equipment. When the organic activator was produced at the facility, chloroform was used in the process and was therefore subject to Subpart

VVVVVV. According to Mr. Thompson, the new process does not use any materials regulated by Subpart VVVVVV.

According to the Subpart VVVVVV May 2013 submittal, all batch chemical manufacturing process unit (CMPU) equipment consists of enclosed piping and vessels and complies with §63.11495. The May 2013 also indicates that HAP usage is significantly less than 10,000 lb/yr and process vent requirements under §63.11496 are not applicable. The May 2013 submittal indicates HAP usage for EUCHEHARDELEN at 3 lbs/year chloroform for 10 batches made in 2012. As part of this inspection EUCHEHARDELEN was not evaluated for full compliance with Subpart VVVVVV.

Conclusion

The facility has been determined to be in noncompliance with the following items.

Polyols Plant - MI-ROP-B4359-2003b, Section 2

- FGPOLEMCON- SC II.B.1.1 - The release of 460 lbs of EO on March 30, 2016 is a violation of the emission limit of 6.4 pounds per hour on a daily average.

Chemical Engineering Research – PTI 80-11

- FGCHEORGACT, SC III. 1, SC IV.1, SC VI. 1. During the inspection, it was identified that the secondary condenser (cooled with chilled glycol) is not in use and the exhaust gas temperature is not monitored.

Wyandotte Resins – PTI 113-07A

- FG-PRODUCTS, SC VIII.1. - During the inspection, the F-1091 stack (SV-PROD) did not meet PTI 113-07A requirements.
- FG-DRUMMING, SC VIII.1. - During the inspection, the drumming stack (SV-DRUM) did not to meet PTI 113-07A requirements.
- FG-RAWMATLS, SC III.1 and 40 CFR 60.112b(a)(3)(ii) - BASF reports the average non-methane VOC destruction efficiency was 73.99% during the December 6, 2016 stack test. This is a violation of 40 CFR 60.112b(a)(3)(ii) and FG-RAWMATLS, SC III.1. SCIII.1 requires compliance with 40 CFR Part 60, Subpart Kb. 40 CFR 60.112b(a)(3)(ii) requires a destruction efficiency of 95%.
- FG-RTO, SC IV.1 - BASF reports the average non-methane VOC destruction efficiency was 73.99% during the December 6, 2016 stack test. SC IV.1 requires a destruction efficiency of 98%.

A violation notice will be issued for the above items.

NAME _____ DATE 5/3/17 SUPERVISOR JK