Ashland LLC
100 Big Sandy River Road
Kenova, WV 25530
www.ashland.com

November 18, 2016

Mr. William F. Durham, Director
West Virginia DEP
Division of Air Quality
601 57th Street SE
Charleston, WV 25304

Re: Permit Determination
Ashland LLC - Neal Plant
100 Big Sandy River Road
Kenova, WV 25530
Title V Air Permit No. R30-09900009
Via Fed-Ex

To Whom It May Concern,

Attached please find the completed Permit Determination form. The site plans to replace D-210 reactor in the fall of 2017.

If you have any questions or concerns, please do not hesitate to contact me at (304) 528-2610 sddunsmore@ashland.com or Kara Long at (614)790-4641 klong@ashland.com.

Sincerely,

Steven Dunsmore
Plant Manager

cc: Steven Dunsmore – Plant Manager

File: APM/Neal, WV/Permits/Air/2016

RECEIVED
NOV 21 2016
WV DEP / DIV OF AIR QUALITY

WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0475
www.dep.wv.gov/daq

PERMIT DETERMINATION FORM (PDF)

FOR AGENCY USE ONLY: PLANT I.D. # _____

PDF # _____ PERMIT WRITER: _____

1. NAME OF APPLICANT (AS REGISTERED WITH THE WV SECRETARY OF STATE'S OFFICE):
ASHLAND LLC

2. NAME OF FACILITY (IF DIFFERENT FROM ABOVE):
ASHLAND LLC – NEAL PLANT

3. NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (**NAICS**) CODE:
325192

4A. MAILING ADDRESS:
100 BIG SANDY RIVER ROAD
KENOVA, WV 25530

4B. PHYSICAL ADDRESS:
100 BIG SANDY RIVER ROAD
KENOVA, WV 25530

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE **MAP** AS **ATTACHMENT A**): The plant is located on the west side of the Big Sandy River Road, 0.9 miles south of the junction of Big Sandy River Road with I-64. The plant is most easily accessed from Exit 1, the Kenova exit, of I-64 then following Rt. 52 south for about 2 miles to the intersection of Rt. 52 and Big Sandy River Road.

5B. NEAREST ROAD:	5C. NEAREST CITY OR TOWN:	5D. COUNTY:
Rt. 52	Kenova	WAYNE
5E. UTM NORTHING (KM): 4,247.7	5F. UTM EASTING (KM): 360.8	5G. UTM ZONE: 17

6A. INDIVIDUAL TO CONTACT IF MORE INFORMATION IS REQUIRED:		6B. TITLE:
Kara Long		Corporate Env Engineer
6C. TELEPHONE: 614-790-4641	6D. FAX:	6E. E-MAIL: klong@ashland.com

7A. DAQ PLANT I.D. NO. (FOR AN EXISTING FACILITY ONLY):
0 9 9 – 00009

7B. PLEASE LIST ALL CURRENT 45CSR13, 45CSR14, 45CSR19 AND/OR TITLE V (45CSR30) PERMIT NUMBERS ASSOCIATED WITH **THIS** PROCESS (FOR AN EXISTING FACILITY ONLY):

7C. IS THIS PDF BEING SUBMITTED AS THE RESULT OF AN ENFORCEMENT ACTION? IF YES, PLEASE LIST:

8A. TYPE OF EMISSION SOURCE (CHECK ONE):
☐ **NEW SOURCE** ☐ **ADMINISTRATIVE UPDATE**
X **MODIFICATION** ☐ **OTHER** (PLEASE EXPLAIN IN 11B)

8B. IF ADMINISTRATIVE UPDATE, DOES DAQ HAVE THE APPLICANT'S CONSENT TO UPDATE THE EXISTING PERMIT WITH THE INFORMATION CONTAINED HEREIN?
☐ **YES** ☐ **NO**

9. IS *DEMOLITION* OR PHYSICAL *RENOVATION* AT AN EXISTING FACILITY INVOLVED? X **YES** ☐ **NO**

10A. DATE OF ANTICIPATED INSTALLATION OR CHANGE:
9/01/2017

10B. DATE OF ANTICIPATED START-UP:
11/01/2017

11A. PLEASE PROVIDE A **DETAILED PROCESS FLOW DIAGRAM** SHOWING EACH PROPOSED OR MODIFIED PROCESS EMISSION POINT AS **ATTACHMENT B**.

11B. PLEASE PROVIDE A **DETAILED PROCESS DESCRIPTION** AS **ATTACHMENT C**.

12. PLEASE PROVIDE **MATERIAL SAFETY DATA SHEETS (MSDS)** FOR ALL MATERIALS PROCESSED, USED OR PRODUCED AS **ATTACHMENT D**. FOR CHEMICAL PROCESSE, PLEASE PROVIDE A MSDS FOR EACH COMPOUND EMITTED TO AIR.

Revision 5/2010

13A. **REGULATED AIR POLLUTANT EMISSIONS:**

⇒ **FOR A NEW FACILITY,** PLEASE PROVIDE PLANT WIDE EMISSIONS BASED ON THE POTENTIAL TO EMIT (PTE) FOR THE FOLLOWING AIR POLLUTANTS INCLUDING ALL PROCESSES.

⇒ **FOR AN EXISTING FACILITY,** PLEASE PROVIDE THE PROPOSED CHANGE IN EMISSIONS BASED ON THE PTE OF ALL PROCESS CHANGES FOR THE FOLLOWING AIR POLLUTANTS.

PTE FOR A GIVEN POLLUTANT IS TYPICALLY BEFORE AIR POLLUTION CONTROL DEVICES AND IS COLLECTED BASED ON THE MAXIMUM DESIGN CAPACITY OF PROCESS EQUIPMENT.

POLLUTANT	HOURLY PTE (LB/HR)	YEARLY PTE (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR) DIVIDED BY 2000 LB/TON
PM		
PM_{10}		
VOCs	2.45	12.09
CO	17.45	90.69
NO_x	0.01	0.08
SO_2	1.30	5.69
Pb		
HAPs (AGGREGATE AMOUNT)		
TAPs (INDIVIDUALLY)*		
OTHER (INDIVIDUALLY)*		

* ATTACH ADDITIONAL PAGES AS NEEDED

13B. PLEASE PROVIDE ALL **SUPPORTING CALCULATIONS** AS **ATTACHMENT E**.

CALCULATE AN HOURLY AND YEARLY PTE OF EACH PROCESS EMISSION POINT (SHOWN IN YOUR DETAILED PROCESS FLOW DIAGRAM) FOR ALL AIR POLLUTANTS LISTED ABOVE INCLUDING INDIVIDUAL HAP'S (LISTED IN SECTION 112[b] OF THE 1990 CAAA), TAP'S (LISTED IN 45CSR27), AND OTHER AIR POLLUTANTS (E.G. POLLUTANTS LISTED IN TABLE 45-13A OF 45CSR13, MINERAL ACIDS PER 45CSR7, ETC.).

14. **CERTIFICATION OF DATA**

I, STEVEN DUNSMORE (*TYPE NAME*) ATTEST THAT ALL THE REPRESENTATIONS CONTAINED IN THIS APPLICATION, OR APPENDED HERETO, ARE TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE BASED ON INFORMATION AND BELIEF AFTER REASONABLE INQUIRY, AND THAT I AM A ***RESPONSIBLE OFFICIAL*** (*PRESIDENT, VICE PRESIDENT, SECRETARY OR TREASURER, GENERAL PARTNER OR SOLE PROPRIETOR*) OF THE APPLICANT.

SIGNATURE OF RESPONSIBLE OFFICIAL: Steven D Dunsmore

TITLE: PLANT MANAGER DATE: 11 / 18 / 2016

** THE DEFINITION OF THE PHRASE '***RESPONSIBLE OFFICIAL***' CAN BE FOUND AT 45CSR13, SECTION 2.23.

NOTE: PLEASE CHECK ENCLOSED ATTACHMENTS:

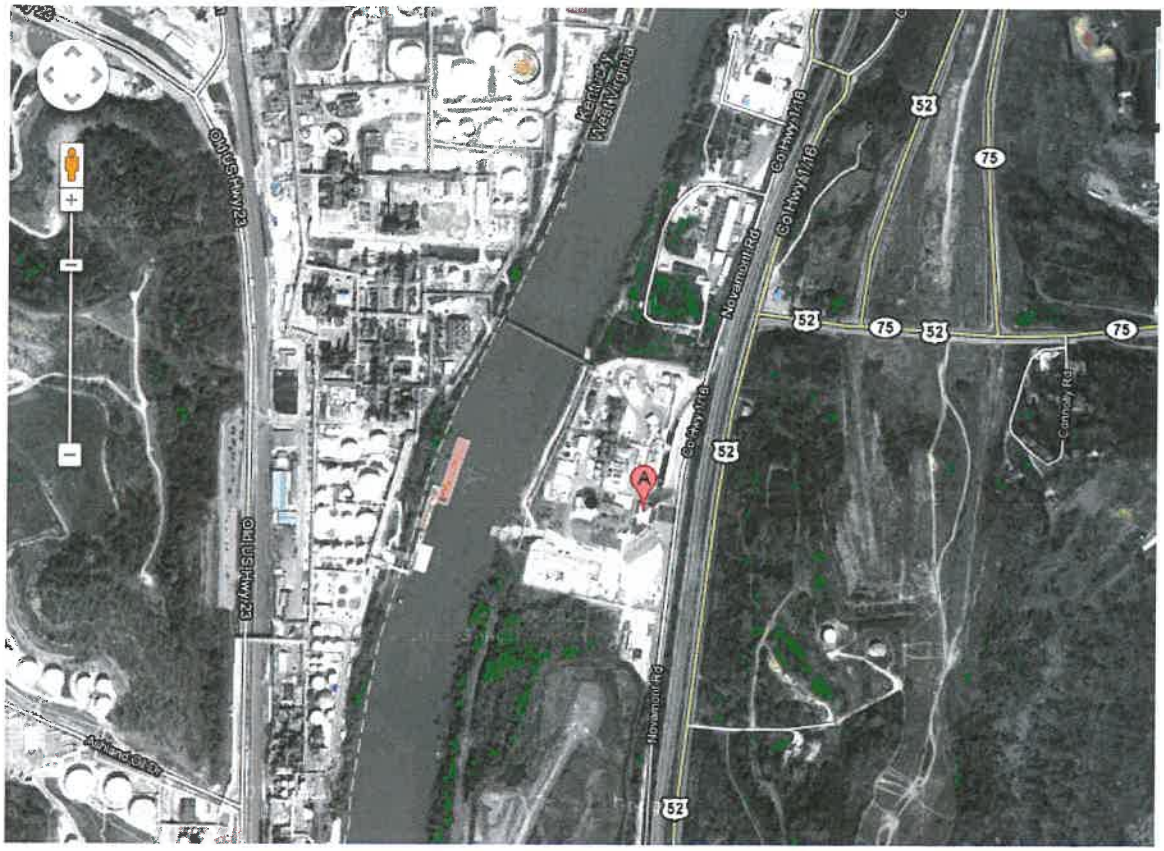
X **ATTACHMENT A** X **ATTACHMENT B** X **ATTACHMENT C** ☐ **ATTACHMENT D** X **ATTACHMENT E**

RECORDS ON ALL CHANGES ARE REQUIRED TO BE KEPT AND MAINTAINED ON-SITE FOR TWO (2) YEARS.

THE PERMIT DETERMINATION FORM WITH THE INSTRUCTIONS CAN BE FOUND ON DAQ'S PERMITTING SECTION WEB SITE:

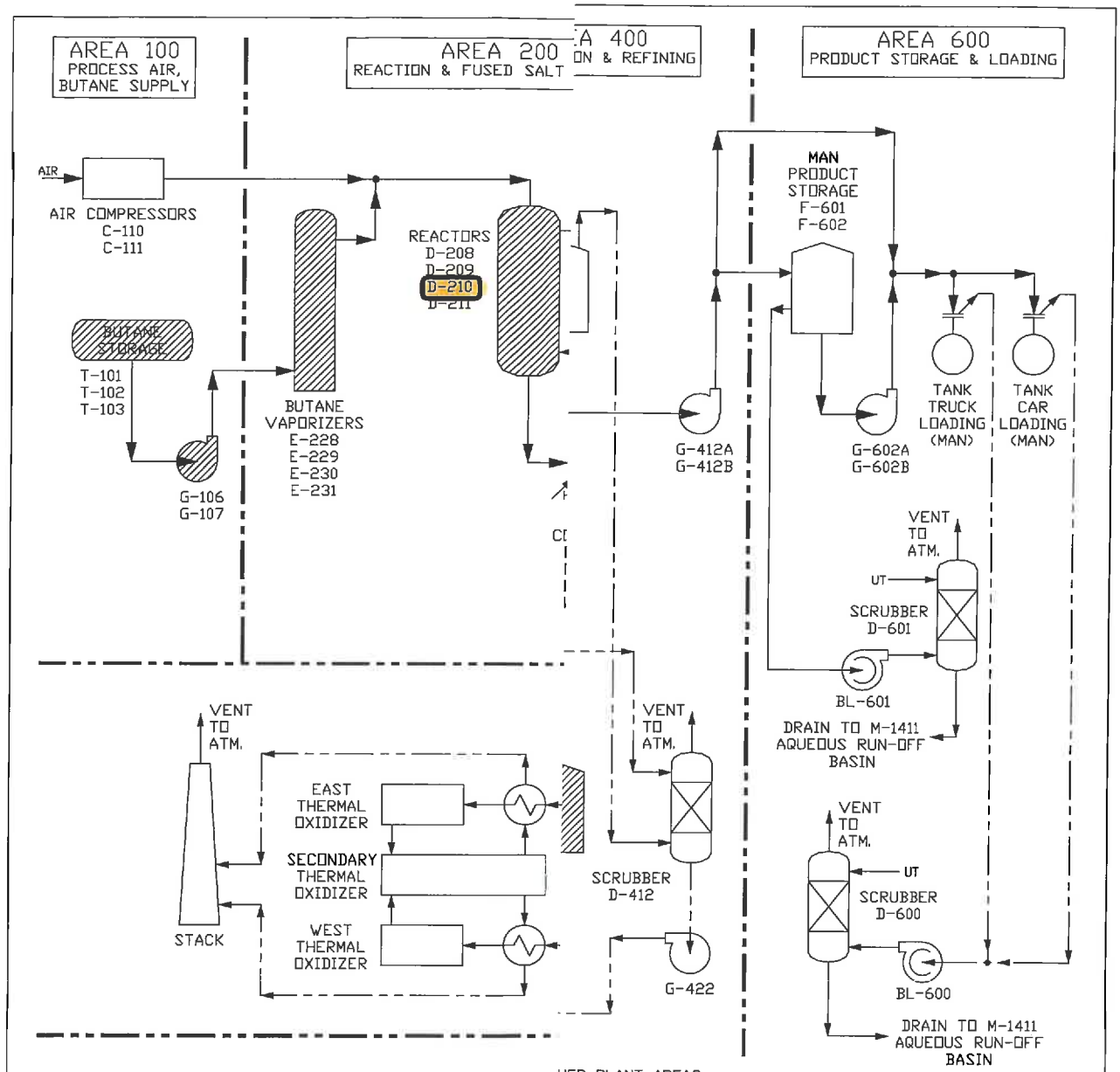
www.dep.wv.gov/daq

Ashland LLC
Neal Plant
100 Big Sandy River Rd
Kenova, WV 25530



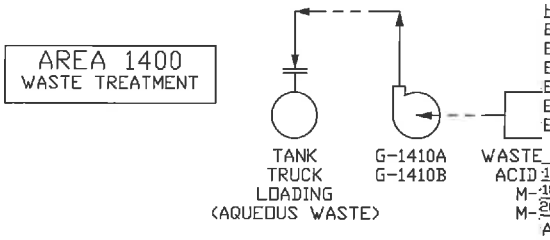
Attachment B

Process Flow Diagram



HER PLANT AREAS:

EA 1000	FIRE WATER SYSTEM
EA 1100	STEAM & CONDENSATE SYSTEMS
EA 1200	COOLING & TEMPERED WATER SYSTEMS
EA 1300	UTILITIES (N2, INST. AIR, DOMESTIC WATER)
EA 1500	GAS & FUEL
EA 1600	MISCELLANEOUS



ATE	DRN.	CHK'D	REVISION DESCRIPTION	APPR.
13-11			REVISED PER FIELD NOTES	HAMILTON
18-98	FDR		ADDED HIGHLIGHTING FOR PSM COVERED PROCESSES	
20-97	FDR	RSH	ISSUED FOR RECORD	

REFINERY WASTE WATER TREATMENT PLANT

ASHLAND

SITE LOCATION NEAL, WV		TITLE BLOCK FLOW DIAGRAM MALEIC ANHYDRIDE PROCESS
IVED TRUCTION DATE	UNIT-BLDG	
	DRN. FDR	
	DATE 8/97	
	CHK'D	
	DATE	DRAWING NO. 366-FD-0001
	SCALE NONE	REV. 2
	PLOT 1:1	
684	PROJ. TITLE GENERAL PLANT	

U:\Completed Drawings\Neal Wv dwgs\F\366-FD-0001 Block Flow Diagra

Attachment C – Process Description

Maleic anhydride is produced by the partial catalytic oxidation of n-butane. A continuous mixture of a compressed air and n-butane stream is passed over a proprietary vanadium-phosphorous catalyst. About 60% of the reacted butane forms maleic anhydride. The main by-products are carbon monoxide, carbon dioxide, and water vapor. Minor by-products consist of acetic acid, acrylic acid, formic acid, and formaldehyde. Since the reaction is highly exothermic, the excess heat is used to produce steam for internal use and for export to the nearby Marathon refinery.

The reactor exit gas stream is cooled and the crude maleic anhydride is partially condensed. The condensed portion is removed in a gas/liquid separator and pumped to an intermediate storage tank. The gas stream passes to a scrubber, where the remaining maleic anhydride is scrubbed from the gas stream and forms maleic acid. The recovered maleic acid resides in an intermediate storage tank. The gas stream then proceeds to a thermal oxidizer, where the hydrocarbons in the gas stream are destroyed and the carbon monoxide is reacted to carbon dioxide. The thermal oxidizer stack is equipped with a carbon monoxide continuous emissions monitor.

While the production of the crude product as described above is done continuously, refining to a finished product is done in a batch distillation process. The maleic acid is azeotropically distilled with xylene to convert the maleic acid back to maleic anhydride and to remove the water. The crude maleic anhydride is added and the mixture is vacuum distilled to a finished product. The distillation process produces a recyclable forecut stream which is stored between batches. The xylene used in the dehydration step is likewise recovered and stored between batches. The water removed during the dehydration step is temporarily stored in a tank having a refrigerated vent condenser to control xylene emissions. This water is used as scrubbing medium for maleic anhydride recovery and is ultimately purged and biologically waste treated.

Periodically the distillation equipment accumulates unrecoverable organic solids on the column internals. These solids are removed by hot water washes which dissolves the solids to form an aqueous solution of maleic and fumaric acids and a maleic/acrylic copolymer (fumaric acid is an isomer of maleic acid). This acid solution is routed to two waste acid tanks, undergoes elementary neutralization using sodium hydroxide solution, and is disposed of in an environmentally approved manner.

Attachment E – Calculations

Ashland Performance Materials
AFS Plant ID # 03-54-09900009
100 Big Sandy River Road
Kenova, WV 25530

Emission Unit No.	001-04
Emission Unit Name	MAN Reactor D-210
Emission Unit Description	Maleic Anhydride Reactor D-210
Emission Unit Comments	Proposed New D-210 Specs: • Tube Length=13.365 ft • Tube ID=0.834 in • Volume/Tube=0.05070 cu ft • # Tubes=13,806 • Total Tube Vol=700.0 cu ft

Potential Thruputs & Hours	
24	Hours / Day
365	Days / Year
8,760	Hours / Year
4,110.640	Pounds Maleic Anhydride / Hour
36,009,208	Pounds Maleic Anhydride / Year
4,680.000	Pounds Butane / Hour
40,996,800	Pounds Butane / Year

04/2013-03/2015 Actual Thruputs & Hours	
24	Hours / Day
326	Days / Year
7,828	Hours / Year
3,127.363	Pounds Maleic Anhydride / Hour
24,479,430	Pounds Maleic Anhydride / Year
3,476.026	Pounds Butane / Hour
27,224,246	Pounds Butane / Year

Air Pollution Control Device(s) (APCD)			
APCD Federally Enforceable??	#1 -- Y	#2 -- Y	#3 -- N
APCD Description	Thermal Oxidizer B-800 (primary) & Abatement Scrubber D-330 (backup)	Thermal Oxidizer B-800 (primary) & Abatement Scrubber D-330 (backup)	
APCD/Stack Capture Efficiency	100.0%	100.0%	0%
Building Capture Efficiency (PM only)	0%	0%	0%
APCD Outlet Grain Loading (gr/dscf)			
APCD Outlet Gas Flow Rate (acfm)			
APCD Outlet Gas Temperature (°F)			
APCD Outlet Gas Moisture			

Comments/Notes for Potential Thruputs & Hours

#1 - Potential (maximum) hourly throughput = 500 SCFM butane flow at 2.0 Mol % feed and 25,000 SCFM air flow (design basis) => 4,254 lb/hr crude Maleic Anhydride (MAN) (design basis) × 96.63% batch refiner yield = 4,110.640 lb/hr refined MAN•• Potential annual throughput = 4,110.640 lb/hr × 8760 hr/yr = 36,009,208 ton/year refined MAN •• per "D-210 Repl Tube Vol Comp.xlsx" attachment to "RE: Calculations for Neal for PSD for new reactor" email sent 03/05/2015 from Kara Long of Ashland

#2 - Potential (maximum) hourly throughput = 500 SCFM butane flow feed to reactor (design basis) × 0.156 lb/SCF butane density × 60 min/hr = 4,680.00 lb/hr butane•• Potential annual throughput = 4,680.00 lb/hr × 8760 hr/yr = 40,996,800 lb/year butane •• per "D-210 Repl Tube Vol Comp.xlsx" attachment to "RE: Calculations for Neal for PSD for new reactor" email sent 03/05/2015 from Kara Long of Ashland

Comments/Notes for 04/2013-03/2015 Actual Thruputs & Hours

#1 - Average of 04/2013-03/2014 and 04/2014-03/2015 (Baseline period) actual throughputs for D-210 = [average of 26,187,794 (04/2013-03/2014) & 22,771,066 (04/2014-03/2015) =] 24,479,430 lb MAN produced from Reactor D-210 •• per "Reactor 210 Data.xlsx" attachment to "D-210 Requested Data" email sent 04/23/2015 from Matt Murray of Ashland

#2 - Average of 04/2013-03/2014 and 04/2014-03/2015 (Baseline period) actual throughputs for D-210 = [average of 28,866,934 (04/2013-03/2014) & 25,561,557 (04/2014-03/2015) =] 27,224,245.5 lb Butane fed into Reactor D-210 •• per "Reactor 210 Data.xlsx" attachment to "D-210 Requested Data" email sent 04/23/2015 from Matt Murray of Ashland

Pollutant	CAS #	HAP	Air Toxic	APCD Control/Removal Efficiency			Potential Uncontrolled Emissions Factors			Actual Uncontrolled Emissions Factors			Uncontrolled Mass Rate of Emissions (UMRE)		Potential to Emit (PTE)		Controlled Potential Emissions		04/2013-03/2015 Actual Emissions		Emissions Increase	
				%	%	%	lb/lb MAN	lb/lb butane		lb/lb MAN	lb/lb butane		lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
TOTAL EMISSIONS																						
PM - filterable																						
PM-10 - filterable																						
PM-2.5 - filterable																						
PM - condensable																						
PM - total																						
PM-10 - total																						
PM-2.5 - total																						
SO2	7446-09-5							0.00028			3.55E-06		1.31	5.74	1.31	5.74	1.31	5.74	0.01	0.05	1.30	5.69
NOx							1.334E-05			1.334E-05			0.05	0.24	0.05	0.24	0.05	0.24	0.04	0.16	0.01	0.06
VOC				99.0%			0.1308019			0.0933393			536.86	2,351.44	5.37	23.51	5.37	23.51	2.92	11.42	2.45	12.09
CO	630-08-0			95.0%			0.2335636			0.1953752			960.10	4,205.22	48.00	210.26	48.00	210.26	30.55	119.57	17.45	90.69
Pb	7439-92-1																					
TOTAL HAPs																						
													Does not include limits/APCDs		Includes "federally enforceable" limits/APCDs		Includes "federally enforceable" limits and all APCDs		Actual operating conditions		Emissions Increase = difference of PTE minus Actual	

Notes:

Pot. Emis. Factors #1 (lb/lb MAN) SCC 3-01-100-02	NOx -- Ashland previously had a NOx CEM in operation, and a NOx emission factor was developed based on 1997 NOx CEM emissions and MAN production and adding an additional 10%, as agreed to by WVDAQ => 0.55 ton NOx/year from all 4 reactors × 2000 lb/ton ÷ 90,694,855 lb MAN produced from all 4 reactors × 110% = 0.0000133415 lb NOx/lb MAN (assume NOx emission factor is same for all 4 reactors)•• per "2013_Emissions_Calculations.xls" attachment to "Neal calculations" email sent 04/01/2015 from Kara Long of Ashland VOC -- Ashland calculates actual VOC emissions daily based on a series of calculations involving several VOC components, which cannot easily be replicated for determination of potential emissions, therefore total VOC emissions and MAN production from all 4 reactors for each of the past 5 years (CY-2010 to CY-2014) were reviewed and the highest annual (CY-2011) VOC emission factor (lb VOC/lb MAN) plus an additional 15% is used as the potential emission factor for D-210 => 43.321 ton VOC/year from all 4 reactors × 2000 lb/ton ÷ 76,291,608 lb MAN produced from all 4 reactors × 115% ÷ (1 - 99%) control efficiency (from oxidizer manufacturer John Zinc) = 0.130602 lb VOC/lb MAN (assume VOC emission factor is same for all 4 reactors)•• per "RUNTOTAL.xls" attachment to "Re: sprdsht for call" email sent 04/23/2015 from Matt Murray of Ashland • and "Hourly Emissions Basis.doc" attachment to "RE: Calculations for Neal for PSD for new reactor" email sent 03/05/2015 from Kara Long of Ashland CO -- Results from 12/14/2005 Stack Test => average CO emission rate of 151.4 lb/hr from all 4 reactors × 115% safety factor for potential emissions ÷ (1 - 95%) control efficiency (from oxidizer manufacturer John Zinc) ÷ average MAN production rate of 14,909 lb/hr from all 4 reactors = 0.233564 lb CO/lb MAN (assume CO emission factor is same for all 4 reactors)•• per "Stack Test Production Data.xls" attachment to "Stack Test, Emissions, and SO2 data." email sent 04/02/2015 from Matt Murray of Ashland • and "Hourly Emissions Basis.doc" attachment to "RE: Calculations for Neal for PSD for new reactor" email sent 03/05/2015 from Kara Long of Ashland
Pot. Emis. Factors #2 (lb/lb butane) SCC 3-01-100-02	SO2 -- Mass balance of Sulfur (S) content in Butane feed to Reactor assume all S in Butane is converted to SO2 • maximum S allowed per spec is 140 ppm => [140 lb S / 10^6 lb Butane] × [64 lb SO2 (MW) / 32 lb S (MW)] = 0.000280 lb SO2/lb Butane •• per "Hourly Emissions Basis.doc" attachment to "RE: Calculations for Neal for PSD for new reactor" email sent 03/05/2015 from Kara Long of Ashland
Act. Emis. Factors #1 (lb/lb MAN) SCC 3-01-100-02	NOx -- Ashland previously had a NOx CEM in operation, and a NOx emission factor was developed based on 1997 NOx CEM emissions and MAN production and adding an additional 10%, as agreed to by WVDAQ => 0.55 ton NOx/year from all 4 reactors × 2000 lb/ton ÷ 90,694,855 lb MAN produced from all 4 reactors × 110% = 0.0000133415 lb NOx/lb MAN (assume NOx emission factor is same for all 4 reactors)•• per "2013_Emissions_Calculations.xls" attachment to "Neal calculations" email sent 04/01/2015 from Kara Long of Ashland VOC -- Actual emissions determined through a series of Ashland's daily calculations involving several VOC components, summed for each 12-month period => [average of 35.174 (04/2013-03/2014) & 63.591 (04/2014-03/2015) =] 49.3825 ton VOC/year from all 4 reactors × 2000 lb/ton ÷ [average of 106,246,801 (04/2013-03/2014) & 105,376,854 (04/2014-03/2015) =] 105,812,827.5 lb MAN produced from all 4 reactors ÷ (1 - 99%) control efficiency (from oxidizer manufacturer John Zinc) = 0.093339 lb VOC/lb MAN (assume VOC emission factor is same for all 4 reactors) per "Reactor 210 Data.xlsx" attachment to "D-210 Requested Data" email sent 04/23/2015 from Matt Murray of Ashland• and "RUNTOTAL.xls" attachment to "Re: sprdsht for call" email sent 04/23/2015 from Matt Murray of Ashland • and "Hourly Emissions Basis.doc" attachment to "RE: Calculations for Neal for PSD for new reactor" email sent 03/05/2015 from Kara Long of Ashland CO -- Actual emissions measured through Continuous Emissions Monitor (CEM) => [average of 447.33 (04/2013-03/2014) & 586.33 (04/2014-03/2015) =] 516.83 ton CO/year from all 4 reactors × 2000 lb/ton ÷ [average of 106,246,801 (04/2013-03/2014) & 105,376,854 (04/2014-03/2015) =] 105,812,827.5 lb MAN produced from all 4 reactors ÷ (1 - 95%) control efficiency (from oxidizer manufacturer John Zinc) = 0.195375 lb CO/lb MAN (assume CO emission factor is same for all 4 reactors)• per "Reactor 210 Data.xlsx" attachment to "D-210 Requested Data" email sent 04/23/2015 from Matt Murray of Ashland • and "RUNTOTAL.xls" attachment to "Re: sprdsht for call" email sent 04/23/2015 from Matt Murray of Ashland• and "Hourly Emissions Basis.doc" attachment to "RE: Calculations for Neal for PSD for new reactor" email sent 03/05/2015 from Kara Long of Ashland
Act. Emis. Factors #2 (lb/lb butane) SCC 3-01-100-02	SO2 -- Actual emissions determined through mass balance of Sulfur (S) content (analyzed monthly) in Butane feed to Reactorassume all S in Butane is converted to SO2 => [average of 1.84 ppm (04/2013-03/2014) & 1.71 ppm (04/2014-03/2015) = 1.775 ppm S in Butane =] 1.775 lb S / 10^6 lb Butane × [64 lb SO2 (MW) / 32 lb S (MW)] = 3.55e-6 lb SO2/lb Butane •• per "Reactor 210 Data.xlsx" attachment to "D-210 Requested Data" email sent 04/23/2015 from Matt Murray of Ashland

SAMPLE CALCULATIONS:

Stack Emissions (PM-grain loading)	Emissions (lb/hr) = (gr/dscf) × (acfm) × [(460 + 70) ÷ (460 + stack gas temp)] × (1 - % gas moisture) ÷ (7000 gr/lb) × (60 min/hr)
Stack Emissions (emission factor)	Emissions (lb/hr) = (lb/unit emission factor) × (units/hr throughput) × (% capture efficiency) × (1 - % control efficiency)
Fugitive Emissions	Emissions (lb/hr) = (lb/unit emission factor) × (units/hr throughput) × (1 - % capture efficiency) × (1 - % building capture efficiency for PM only)