

Fact Sheet



For Final Minor Modification Permitting Action Under 45CSR30 and Title V of the Clean Air Act

This Fact Sheet serves to address the changes specific to this Minor Modification, and shall be considered a supplement to the Fact Sheet corresponding with the Title V operating permit issued on June 5, 2023.

Permit Number: **R30-10700001-2023**
Application Received: **August 5, 2023 (MM01)**
December 21, 2023 (MM02)

Plant Identification Number: **03-54-10700001**
Permittee: **DELRIN USA, LLC**
Facility Name: **Washington Works**
Mailing Address: **P.O. Box 2800, Washington, WV 26181-2800**

Permit Action Number: *MM01 and MM02* Revision Date: *April 30, 2024*

Physical Location:	Washington, Wood County, West Virginia
UTM Coordinates:	442.368 km Easting • 4,346.679 km Northing • Zone 17
Directions:	Route 68 west from Parkersburg to intersection of Route 892. Continue west on Route 892 with the plant being on the north side about one mile from the intersection of Routes 68 and 892.

Facility Description

The Delrin® Business unit is divided into three areas which work together to produce a finished acetal product. The first area is the **Formaldehyde Area** which produces the formaldehyde to be fed to the process. The formaldehyde is used in the **Chemical Area** which conditions the formaldehyde and converts it into polymer. The polymer is then sent to the **Finishing Area** where it is extruded with additives into finished pellets which are then sold.

Formaldehyde Area

The Delrin® formaldehyde plant is designed to produce a formaldehyde/water solution. Heat of reaction is recovered to produce steam used in the Delrin® Chemical Area. The plant consists of multiple reactor loops each containing a reactor, blower, vaporizer, and a heat transfer fluid condenser/steam generator.

Common equipment to the reactor loops include absorbers, a catalytic converter, a boiler feed water tank, a caustic tank, and a heat transfer fluid heater and storage tank. Support facilities include a cooling tower, methanol storage tanks, and formaldehyde tanks. Methanol is normally received by barge and infrequently by tank truck. It is stored in tanks. Formaldehyde is produced by air oxidation of methanol over catalyst. The methanol gas feed stream is converted to a gas stream containing formaldehyde, unreacted methanol, and reaction byproducts. The hot reactor gas passes through the vaporizer to provide heat to vaporize the liquid methanol feed. The gases then flow through the absorbers, where formaldehyde and water vapor are removed from the gas stream by scrubbing. Absorber pH is controlled by adding caustic solution. The liquid product stream is adjusted to a specified formaldehyde concentration after leaving the absorbers by mixing with a dilute formaldehyde stream. The aqueous formaldehyde product is stored in the formaldehyde tank farm for feed to the Delrin[®] Chemical Area. The process gas which exits the absorbers is primarily nitrogen and oxygen, with small amounts of formaldehyde, water, methanol, carbon monoxide, and dimethyl ether. Most of the exit gas is mixed with air and returned to the reactor via the blower. The amount of recycle gas is controlled to maintain non-explosive conditions. As the process gas is returned to the reactor, it passes through a vaporizer where fresh methanol is added. As previously noted, heat is supplied by the hot reactor gases. Additional heat of reaction is removed from the reactor by boiling heat transfer fluid in the reactor shell. The heat transfer fluid vapor passes to a condenser where it is condensed by boiler feed water generating steam that is used elsewhere in the plant. Process gas that is not recycled to the reactor loops flows through the catalytic converter system for air emissions control.

Chemical Area

The polymerization of Acetal resin homopolymer starts with the purification of the formaldehyde monomer stream. The general feedstock for the purification stream may be either manufactured on site or trucked into the facility after purchase on the open market. This liquid solution of formaldehyde is then treated in an extraction column where an aliphatic alcohol mixture is used to selectively extract the formaldehyde from the water by forming an alcohol mixture by forming an alcohol hemiformal. This alcohol hemiformal is then dried to remove water and impurities that are found in almost all formaldehyde. After drying the material, the purified hemiformal is then thermally decomposed to generate essentially pure formaldehyde vapor through the use of a pyrolyzer and partial condenser system. A scrubber system is used to absorb the monomer generated during the start up of the polymerization process. The formaldehyde vapor exiting the partial condenser is sent to a polymerization vessel that contains a commercial heptane solvent blend as the carrier solvent for the forming homopolymer particles. This polymerization is cooled to remove the exothermic heat of reaction evolved in the polymerization. The polymerization vessel operates continuously with both formaldehyde and solvent feeds occurring continuously. A solvent and polymer slurry is constantly withdrawn from the polymerization vessel and sent to isolation to separate the polymer. The recovered solvent is recycled for further use in the process. Periodically the polymerization vessel must be shutdown to clear the vessel of polymer build up. This clean out is performed through a condenser based emission control system with a different emission point. The homopolymer and solvent slurry mixture produced in the polymerizer during normal operation is fed to a separation device that isolates the solids and drops them into a conveyor/dryer system. The solids are placed into a set of intermediate storage bins. These bins feed a conveying system that transports the intermediate polymer (raw fluff) to a reactor processing vessel that “caps” the homopolymer chains with a terminating agent to improve the stability of the polymer chains. The capping is done with excess of the required amount of capping agent present. The capping reagent and evolved formaldehyde are recovered for further purification and reuse. The formaldehyde recovered is sent to other parts of the process for concentration and recycled back to the feed tank of the initial process. The capped polymer exits from the capping reactor and is treated to reduce the residual reactants present on the polymer. Upon exiting this final process the finished product is ready for either conversion to another form or the direct sale or transfer to other processors. This is also the point of definition for the final product for the Acetal MACT (40 CFR 63 Subpart YY) standard.

Finishing Area

The capped fluff is loaded out into boxes for temporary storage or shipment; or into rail cars for temporary storage or shipment. It may also be loaded into sea-land boxes for shipment overseas, or fed to a set of conversion lines in which other materials and modifiers are added to the fluff to produce modified polymers in pellet form. In the finishing area the pelletized polymer is produced by six extrusion lines that are used to alter the form of the product produced in the plant through the use of additives, heat, and pressure. These modified products exhibit improved characteristics that improve their market value. Raw materials for the extrusion system are received in boxes, bags, leverpaks, and by pneumatic transport from other portions of the facility.

The materials are fed directly to extruders through metering devices, or used to make blends for a similar incorporation into a final product. Raw materials for the extrusion lines include modifiers, colors, and base plastic materials. Some finished material from the polymerization unit is packed out directly for shipment to other processors or for interim storage. The extrusion feed material is fed to the extruders where the materials are thoroughly mixed and converted to another product form by extrusion. The product, usually in the form of pellets, is dried, screened, conveyed, and packaged into either shipping or storage containers. The material is then shipped to other users or to customers.

Emissions Summary

This modification results in the following emission changes:

Pollutant	Change in Potential Emissions (tpy)
Carbon Monoxide (CO)	0.34
Nitrogen Oxides (NO _x)	0.11
Volatile Organic Compounds (VOC)	0.22
Particulate Matter (PM ₁₀)	0.26
Sulfur Dioxide	0.01
Formaldehyde	-0.09
Hexane	-0.02
Methanol	-0.42
Hazardous Air Pollutants	-0.55

Title V Program Applicability Basis

This facility has the potential to emit 244.1 tons of VOC per year, 19.58 tons of Formaldehyde per year and 34.31 tons of Total HAPs per year. Due to this facility's potential to emit over 100 tons per year of criteria pollutants, over 10 tons per year of an individual HAP, and over 25 tons per year aggregate HAPs, DELFIN USA, LLC is required to have an operating permit pursuant to Title V of the Federal Clean Air Act as amended and 45CSR30.

Legal and Factual Basis for Permit Conditions

The State and Federally-enforceable conditions of the Title V Operating Permits are based upon the requirements of the State of West Virginia Operating Permit Rule 45CSR30 for the purposes of Title V of the Federal Clean Air Act and the underlying applicable requirements in other state and federal rules.

The modification to this facility has been found to be subject to the following applicable rules:

Federal and State:	45CSR6	Open burning prohibited.
	45CSR7	Prevent and Control Particulate Matter Air Pollution From Manufacturing Processes
	45CSR13	Preconstruction permits for minor sources.
	45CSR30	Operating permit requirement.
State Only:	45CSR27	Prevent and Control Emissions of Toxic Air Pollutants

Each State and Federally-enforceable condition of the Title V Operating Permit references the specific relevant requirements of 45CSR30 or the applicable requirement upon which it is based. Any condition of the Title V permit that is enforceable by the State but is not Federally-enforceable is identified in the Title V permit as such.

The Secretary's authority to require standards under 40 C.F.R. Part 60 (NSPS), 40 C.F.R. Part 61 (NESHAPs), and 40 C.F.R. Part 63 (NESHAPs MACT) is provided in West Virginia Code §§ 22-5-1 *et seq.*, 45CSR16, 45CSR34 and 45CSR30.

Active Permits/Consent Orders

The active permits/consent orders affected by this modification are as follows:

Permit or Consent Order Number	Date of Issuance	Permit Determinations or Amendments That Affect the Permit (<i>if any</i>)
R13-1849Q	9/27/2023	
R13-2381O	2/13/2024	

Conditions from this facility's Rule 13 permit(s) governing construction-related specifications and timing requirements will not be included in the Title V Operating Permit but will remain independently enforceable under the applicable Rule 13 permit(s). All other conditions from this facility's Rule 13 permit(s) governing the source's operation and compliance have been incorporated into this Title V permit in accordance with the "General Requirement Comparison Table," which may be downloaded from DAQ's website.

Determinations and Justifications

MM01 (based on changes approved under R13-1849Q)

Change in emissions as a result of MM01:

Emission Point	Pollutant	Emission Changes	
		pph	tpy
DNTFFE	PM	0.01	0.01
	VOCs	0.17	0.72
	NOx	0.03	0.11
	SO2	0.01	0.01
	CO	0.08	0.34
DEME	VOCs	-4.00	-0.09
	HAPs	-1.69	-0.04
	Formaldehyde	0.03	0.00
	Hexane	-1.50	-0.02
	Toluene	-0.22	0.00

1.1 Emission Units table was changed to include emergency flare DNTFF.

Section 5.1.1 was changed to include the following language: ‘Except where a state or federal standard specifies a monitoring period for determining compliance with the emission limitations as specified in Table 5.1.1., compliance with the pound per hour limits of this section shall be demonstrated on no more than a 3-hour rolling block average.’

Table 5.1.1. was changed to include emission limits for the new flare, emission point DNTFFE, as follows:

Emission Point	Pollutant	Emission Limit	
		pph	tpy
DNTFFE	PM	0.01	0.01
	VOC	0.17	0.72
	NO _x	0.03	0.11
	SO ₂	0.01	0.01
	CO	0.08	0.34

These are the emissions from the flare pilot flames.

Table 5.1.1. was changed to revise the emission limits for emission point DEME as follows:

Emission Point	Pollutnat	Emission Limit	
		pph	tpy
DEME	VOC	31.9627.96	0.720.63
	Formaldehyde	1.311.34	0.03
	Hexane	1.510.01	0.030.01
	Toluene	0.610.39	0.01
	THAP	3.431.74	0.080.04

Section 5.1.8.2. was revised by renumbering the original flare requirement as section 5.1.8.2.1 and noting that it is applicable to emission point HZZC. Section 5.1.8.2.2 was added as a State-Only Enforceable Requirement for the new flare, emission point DNTFF.

Section 5.1.10. was changed to include the sentence ‘The minimum temperature for the Comparable Fuels Boiler (DOMC) is 1,562 °F (850 °C) when combusting waste off gas without hazardous waste.’

Section 5.1.14. was changed to specify capper events for emission units GZZ1 and GZZ2 and increase the annual maximum capper events from 36 to 45 events per capper DPH and capper DPL respectively. Increasing these events results in only a slight increase in emissions because the applicant claims the number of capper events were changed in a previous permit and a higher number of capper events than limited by 5.1.14 were used in the original calculation.

Section 5.2.7. was changed to include 5.2.7.1 as it applies to flares subject to 40 CFR 63 Subpart SS and to include 5.2.7.2. for the new flare, DNTFFE, subject to 5.1.8.2.2.

Section 5.3.8. was changed to reserved because the referenced 40CFR§261.38 has been vacated and changed to Reserved.

Section 5.4.13 was changed to include 5.4.13.b for recordkeeping of the pilot flame status as required by section 5.2.7.2 for the new flare, DNTFFE.

Section 5.4.29 was updated to require recordkeeping of the number of capper maintenance events per capper emission units in alignment with section 5.1.14.

APPENDIX C.1 (Parametric Monitoring) was updated to include the new flare monitoring parameters.

APPENDIX C.1 (Parametric Monitoring) was updated to include changes to DEM-OH. The scrubber flow rate parameter was changed to >35 gpm when GZZ1 and GZZ2 of the emission unit are in operation. The averaging period was changed to 3-hours similar to the other flow rates. The maximum flow rate limit was counterintuitive so long as the scrubber does not become flooded. The applicant believes that due to physical limits on the water supply line to the scrubber that flooding is not possible and allowing the flow rate greater than 35 gpm will improve abatement of emissions in that it will allow the flow to be slightly greater than 50 gpm at times.

MM02 (based on changes approved under R13-2381O)

Change in emissions as a result of MM02:

Emission Point	Emission Unit Description	Pollutant	Before(TPY)	After(TPY)	Change(TPY)
HSP-E	HSP-S Packaging Station	PM ₁₀ /PM _{2.5}	0.01	0.28	0.27
		VOC	1.05	0.59	-0.46
		Methanol	0.53	0.07	-0.46
		HAP (Formaldehyde 50000)	0.53	0.44	-0.09
		Total HAP	1.05	0.50	-0.55
HSI-E	HSI-S Impact Separator	PM ₁₀ /PM _{2.5}	0.03	0.02	-0.01
		VOC	0.04	0.09	0.05
		HAP (Formaldehyde 50000)	0.02	0.04	0.02
		HAP (Methanol)	0.02	0.03	0.01
		Total HAP	0.04	0.07	0.03
DWK-E (removed)	Extruder #4 Screener	PM ₁₀ /PM _{2.5}	0.01	0	-0.01
		VOC	0.09	0	-0.09
		HAP (Formaldehyde 50000)	0.09	0	-0.09
		HAP (Methanol)	-	-	-
		Total HAP	0.09	0	-0.09
DTZ-E	D4 Sorter System	PM ₁₀ /PM _{2.5}	0.01	0.01	0.00
		VOC	0.42	0.51	0.09

Emission Point	Emission Unit Description	Pollutant	Before(TPY)	After(TPY)	Change(TPY)
		HAP (Formaldehyde 50000)	0.16	0.23	0.07
		HAP (Methanol)	0.02	0.05	0.03
		Total HAP	0.18	0.28	0.10

The following changes were made to Table 1.1 Emission Units of the permit:

Emission unit ID No DSS4-S for the D4 Sorter System was added to the table.

Emission unit ID No DWK-S #4 Ext. Fines Screener was deleted from the table.

The Emission Point ID No., Control Device ID No., and emission unit description for HSB-S were revised in the table.

The row for the HSA-S Ext.#7 - Building Dust Collector with emission point HSI-E was deleted from the table. This was included in the previous permit application but was incorrect. Instead of having the building as the emission unit, HSAD-S, HSBD-S, HSGD-S, HSLR-S, HSMN-S, HSMS-S, HSRW-S, HSSF-S, HSTM-S, and HSVF-S were added to the table as individual emission units all emitting to the Dust Collector, HSI-C with emission point HSI-E.

Emission point DWK-E was deleted from the list of equipment subject to Sections 6.1.3, 6.1.7, 6.1.8, and 6.2.2.

In Appendix D.1, Control Device ID DTZ-C uncontrolled PM emissions were decreased from 0.65 lbs/hr to 0.39 lbs/hr.

In Appendix D.1, Control Device ID HSI-C uncontrolled PM emissions were decreased from 0.47 lbs/hr to 0.39 lb/hr.

In Appendix D.1, Control Device ID HSP-C was deleted. This device is a cyclone and not a bagfilter.

In Appendix D.2, limits were changed as follows:

Emission Point	Control Device	Pollutant	Permitted Emissions	
			Hourly (lb/hr)	Annual (ton/yr)
DTZ-E	DTZ-C	PM ₁₀	0.01	0.01
		VOC	0.13 0.15	0.42 0.51
		Total HAP	0.06 0.08	0.18 0.28
		Formaldehyde	0.05 0.07	0.16 0.23
		Methanol	0.01 0.02	0.02 0.05
HSI-E	HSI-C	PM	0.01	0.03
		PM ₁₀	0.01	0.03 0.02
		Formaldehyde	0.01	0.02 0.04
		Methanol	0.01	0.02 0.03
		VOC	0.01 0.02	0.04 0.09
		THAP	0.01 0.02	0.04 0.07
HSP-E	HSP-C	PM	0.01	0.03
		PM ₁₀	0.01 0.07	0.01 0.28
		VOC	0.24 0.14	1.05 0.59

Emission Point	Control Device	Pollutant	Permitted Emissions	
			Hourly (lb/hr)	Annual (ton/yr)
		Methanol	0.12 0.02	0.53 0.07
		Formaldehyde	0.12 0.10	0.53 0.44
		THAPs	0.24 0.12	1.05 0.50

In Appendix D.2, the PM row was deleted from HSE-E, HSF-E, HSI-E, HSP-E, HSQ-E, and HSV-E.

In Appendix D.2, the emission limits for DWK-E were deleted.

Section 3.7.2.p was added because it was determined that 40 C.F.R. 63, Subpart FFFF is not applicable to the Acetal Resin Production Area as described in the Non-Applicability Determinations below.

Non-Applicability Determinations

The following requirements have been determined not to be applicable to the subject facility due to the following:

40 C.F.R. 63, Subpart FFFF – “National Emission Standards for Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing.” The extrusion and compounding operations of the Acetal Resin Production Area are exempt from 40 C.F.R. 63 Subpart FFFF because:

- Per 40 C.F.R. §63.2435(c)(4): They are compounding operations (in which blending, melting, and resolidification of a solid polymer product occur for the purpose of incorporating additives, colorants, or stabilizers); or are extrusion and drawing operations (converting an already produced solid polymer into a different shape by melting or mixing the polymer and then forcing it or pulling it through an orifice to create an extruded product).; or neither use HAP solvents nor emit “residual HAP monomer”.
- The associated non-extruder or non-compounding unit operations of the Finishing Area of the Acetal Resin Production Area do not meet the definition of a miscellaneous organic chemical manufacturing process units (MCPU) as defined in 40 C.F.R. §63.2550.

Request for Variances or Alternatives

None.

Insignificant Activities

Insignificant emission unit(s) and activities are identified in the Title V application.

Comment Period

Beginning Date: N/A
 Ending Date: N/A

Point of Contact

All written comments should be addressed to the following individual and office:

Jonathan Carney
 West Virginia Department of Environmental Protection
 Division of Air Quality
 601 57th Street SE
 Charleston, WV 25304
 304/926-0499 ext. 41247
 Jonathan.W.Carney@wv.gov

Procedure for Requesting Public Hearing

During the public comment period, any interested person may submit written comments on the draft permit and may request a public hearing, if no public hearing has already been scheduled. A request for public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing. The Secretary shall grant such a request for a hearing if he/she concludes that a public hearing is appropriate. Any public hearing shall be held in the general area in which the facility is located.

Response to Comments (Statement of Basis)

Comments from DELTRIN USA, LLC (received via email on April 29, 2024)

Comment 1 – In the Facility Description in the Fact Sheet the term “raw polymer” is incorrect. Raw polymer is processed only in the polymerization process of the plant and is not transferred to the Finishing process of the plant. The commenter suggests the deletion of the term “raw” in two places in the Facility Description.

Response – The DAQ agrees with the suggested change and has deleted the term “raw” as suggested.

Comment 2 - With the addition of Extruder #7 line in 2022, there are six extrusion lines. The commenter suggests that the number of extrusion lines in the description of the Finishing Area in the Fact Sheet be changed from five to six.

Response – The DAQ agrees with the suggested change and has changed the number of extrusion lines in the Finishing Area description from “five” to “six”.

Comment 3 – The R13-2381O permit is correct but in two instances there are typos that should be corrected in the Title V permit. The Emission Units table of section 1.1 incorrectly lists control device DZB-C being associated with source HHN-S in the Title V permit, but in the permit R13-2381O there is no control device listed to which it vents. DELTRIN USA believes that when HHN-S and other sources, including HOP-S, were added to the permit in 2019 under permit R13-2381K, the control device DZB-C was later added to the Title V permit for both sources HHN-S and HOP-S. These sources appear in the table one below the other and we believe it was a typo to add “DZB-C” rather than “None” as a control device for source HHN-S.

Response – The DAQ agrees that the control device, DZB-C, listed with Emission Unit HHN-S in the Table of section 1.1 is incorrect. DAQ has changed the control device of Emission Unit HHN-S from “DZB-C” to “None.”

Comment 4 – It appears that source DTP-S has a typo with regard to the suffix used to describe its emission point. The convention used in our permits is that the suffix “-S” refers to sources, the suffix “-E” refers to emission points, and the suffix “-C” refers to control devices. The emission point for DTP-S uses the incorrect suffix of “-C”.

Response – The DAQ agrees with the suggested change. DAQ has changed the emission point of DTP-S from DZB-C to DZB-E in Section 1.1 Table.