



STATEMENT OF BASIS
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BAQ Air Permitting Division

Company Name:	DSM Nutritional Products LLC	Permit Writer:	Wilson Pang
Agency Air Number:	2320-0001	Date:	DRAFT
Permit Number:	TV-2320-0001 v2.0		

DATE APPLICATION RECEIVED: September 08, 2023

DATE OF LAST INSPECTION: August 14, 2024; No violations observed

PROJECT DESCRIPTION

This is a Title V Operating Permit Renewal.

FACILITY DESCRIPTION

SIC CODE: 2076 – Vegetable Oil Mills, except Corn, Cottonseed, and Soybean

NAICS CODE: 311224 – Soybean and Other Oilseed Processing

DSM Nutritional Products, located in Kingstree, SC, primarily produces nutritional supplements from biomatter. This facility's primary products are nutritional oils produced through fermentation, oil extraction, and final product purification. Those products include DHA and ARA. Solvent such as hexane is used in the extraction of products. In addition, this facility carries out contract fermentation projects and may perform certain downstream steps to filter, concentrate, dry, and/or purify the product. The plant is divided into the following major processes:

Fermentation and West Plant Filtration

The fermentation process is segmented into two steps. In the first step, the seed fermenter containing a sterile nutrient medium is inoculated with a selected microbial culture. The seed fermenter is designed to promote the growth of the microbial population to the level necessary for proper fermentation in the deep tank vessel. The second step starts when the final contents of the seed fermenter are aseptically transferred through a pipe network to a large fermenter tank. This mixture is aerated and allowed to ferment for continued biomass growth and production of the desired product. The fermentation areas and associated downstream equipment are used for oil products (DHA and ARA).

The West Plant Filtration is used to dry biomass generated from fermentation. The system consists of a broth storage tank, a filter, a dryer (heated by the existing boilers), and a press water tank. Emissions from the dryer are controlled by a wet scrubber. Prior to the wet scrubber, the material is sent through one of two cyclones that are used for material handling.

Spray Drying

The wet biomass leaving fermentation is sent to the spray dryers. The spray drying system (Emission Unit ID 30) is designed to evaporate water from the solution. Each spray dryer is equipped with a wet scrubbing system that consists of a cyclone separator, a wet fan, a venturi injector, and a wet cyclone to capture the dry powder. The dry cyclone separator functions as a product recovery device and is not used for pollution control. The spray drying system also contains a pneumatic conveyor used to transfer the dried mash from the cyclone separator to a storage operation. A baghouse is used to control emissions from each spray dryer transfer operation.

DHA Extraction

The DHA oil extraction process begins when dried biomass is transferred via the Mechanical drag conveying system into a tank containing isohexane. Biomass/isohexane (slurry) is processed through a two-stage extraction system, where the spent biomass (meal) is separated from the isohexane/oil (miscella). The miscella travels to the 1st evaporator to be partially desolventized. Partially desolventized miscella is pumped through a centrifuge for further clarification. The remainder of the isohexane is removed from the oil using the second and final evaporator.



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Isohexane is removed from the solvent-laden biomass using a desolventizer which uses indirect steam heating to remove the solvent from the biomass. Miscella exiting the second stage of the extraction is mixed with fresh biomass entering the process or proceeds forward to the first evaporator. The two products produced in the DHA oil extraction process are DHA Oil and DHA Meal. The entire process is carried out on a continuous basis in sealed vessels. All vessels vent to the isohexane recovery system which includes condensers and a mineral oil scrubber system (MOS) where the solvent is recovered and reused.

ARA Extraction

The ARA process begins when dried biomass is transferred via super-sacs to a hopper where the biomass is “washed” with isohexane. The isohexane is evaporated from both the solvent/oil mixture (called miscella) and the solvent laden biomass. The solvent (isohexane) is evaporated (desolventized) from the oil by exposing the miscella to steam. The solvent is condensed, separated from the steam condensate, and reused. Isohexane is removed from the solvent-laden biomass using a desolventizer which uses indirect steam heating to remove solvent from the biomass. The desolventizer also conditions the biomass for further use as food grade meal. There are two products produced in the oil extraction process - ARA oil and ARA meal. The entire process is carried out on a continuous basis in sealed vessels. All vessels vent to the isohexane recovery system which includes several condensers and a MOS where the solvent is recovered and reused.

RBD

Oils from DHA, ARA, and other imported oils are refined, bleached, and deodorized in the RBD process. Refining is accomplished by the addition of sodium hydroxide to neutralize fatty acids and reduce the color. Water soluble soaps are formed in the refining process. The solution is heated prior to the separation of soaps in centrifuges. The refined oil is then directed to the bleaching operation. During the bleaching process, color bodies as well as entrained soaps are removed. Bleaching is carried out by mixing absorbents into the oil. This is carried out under a vacuum at elevated temperatures. This mixture is filtered to remove the absorbents. The resulting intermediate is then directed to the deodorizing operation. Deodorizing removes residual organics that can cause odor in the final product. The oil is heated again under vacuum. Steam is sparged through the oil to strip the residual organics and provide agitation. Oil from this step is drummed and sent to storage or blending.

Fluid Bed Granulator

The Fluid Bed Granulator is used to produce a dried, granulated product. Some types of biomass slurry produced in fermentation are dried in this way. Steam from the boilers is used as the heat source for the dryer. Air is blown through the dryer and routed to dual cyclones which are used for product recovery. Captured solids are routed back to the dryer. Exhaust air from the cyclones is discharged to a bag filter.

CHANGES SINCE LAST OP ISSUANCE

Construction Permit 2320-0001CX issued on December 19, 2022 – Permission granted to install a 49.28 Million Btu/hr Natural Gas/No. 2 Fuel Oil-Fired Boiler (ID BOIL9). The boiler will be added to EU37 – Boilers.

VOID EQUIPMENT

The following emission units/equipment have been deemed VOID and will be removed from the current operating permit. A comprehensive record of voided equipment for the site can be found in ePermitting under Program Components.



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Emission Unit ID	EU Description	Equipment ID	Equipment Description	Reason for VOID Status	Date Removed
19	West Plant Boiler	All	4.2 MMBtu/hr natural gas-fired West Plant Boiler	Moved to insignificant activities list	9-24-12
20	Boiler #3	All	25.1 MMBtu/hr Natural Gas and No. 2 Fuel Oil Fired Boiler	Moved to EU 37	9-24-12
21	Boiler #4	All	25.1 MMBtu/hr Natural Gas and No. 2 Fuel Oil Fired Boiler	Moved to EU 37	9-24-12
22	Boiler #5	All	25.1 MMBtu/hr Natural Gas and No. 2 Fuel Oil Fired Boiler	Moved to EU 37	9-24-12
23	Boiler #7	All	25.1 MMBtu/hr Natural Gas and No. 2 Fuel Oil Fired Boiler	Moved to EU 37	9-24-12
24	Boiler #8	All	25.1 MMBtu/hr Natural Gas and No. 2 Fuel Oil Fired Boiler	Moved to EU 37	9-24-12
25	West Plant Fermentation	All	Equipment associated with this emission unit	Idle	2-22-19
31	Dense Phase Conveying	All	Equipment associated with this emission unit	Removed from service	2-22-19
35	Friolex	All	Equipment associated with this emission unit	Removed from service	2-22-19

EMISSIONS

FACILITY WIDE EMISSIONS			
Pollutant	Uncontrolled	Controlled	PTE
	TPY	TPY	TPY
PM	813.09	37.96	<100.0
PM ₁₀	813.08	37.96	<100.0
PM _{2.5}	813.08	37.96	<100.0



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FACILITY WIDE EMISSIONS			
Pollutant	Uncontrolled	Controlled	PTE
	TPY	TPY	TPY
CO	90.37	--	90.37
SO ₂	1.48	--	<100.0
NO _x	158.35	--	<100.0
VOC	229.89	--	<250.0
Total HAPs	40.0	--	<25.0
Hexane	39.86	--	<10.0

*NO_x actual emissions are less than the <100.0 tpy PTE and HAPs actual emissions are less than <10.0 tpy (individual HAP) and <25.0 tpy (total HAPs) PTE

REGULATIONS

Applicable - Section II(E) (Synthetic Minor)

The facility's current Title V permit contains an avoidance limit of <100.0 tpy for NO_x, SO₂, and PM₁₀/PM_{2.5} and <250.0 tpy for VOCs that was carried over from when the facility operated under a conditional major permit. The facility requested these limits to remain during their Title V permit renewal.

The facility is a potential major source for single and total HAPs. The facility has taken federally enforceable limits of <10.0 TPY for single HAPs and <25.0 TPY for total HAPs as shown in the table labeled "Synthetic Minor and PSD Limits."

Synthetic Minor and PSD Limits					
Permit ID	Equipment ID	Permit Issue Date	Pollutant	Emission Limit (TPY)	Explanation
2320-0001-CR	Facility-Wide	2/18/04	PM ₁₀ /PM _{2.5}	<100.0	Title V and PSD Avoidance Limits
2320-0001-CR	Facility-Wide	2/18/04	NO _x	<100.0	
Cond. Major	Facility-Wide	1/04/01	SO ₂	<100.0	
2320-0001-CU	Facility-Wide	12/1/04	VOC	<250.0	
Cond. Major	Facility-Wide	1/04/01	HAPs	<10.0 Individual <25.0 Total	



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Applicable - Standard No. 1 (Emissions from Fuel Burning Operations)

ID	PM Allowable (lb/hr)	SO ₂ Allowable (lb/hr)	Uncontrolled Emissions		Controlled Emissions	
			PM (lb/hr)	SO ₂ (lb/hr)	PM (lb/hr)	SO ₂ (lb/hr)
BOIL01 (25.1 million BTU/hr)	15.06	57.73	0.59	0.04	--	--
BOIL02 (25.1 million BTU/hr)	15.06	57.73	0.59	0.04	--	--
BOIL06 (25.1 million BTU/hr)	15.06	57.73	0.59	0.04	--	--
BOIL07 (63.0 million BTU/hr)	37.80	144.90	1.49	0.10	--	--
BOIL08 (63.0 million BTU/hr)	37.80	144.90	1.49	0.10	--	--
BOIL09 (49.29 million BTU/hr)	29.60	113.30	1.16	0.029	--	--

Visible Emissions (Section I) – The following boilers were constructed prior March 11, 1971 and are subject to the 40% opacity limit: ID BOIL01, ID BOIL02

The following boilers were constructed After March 11, 1971 and are subject to the 20% opacity limit: ID BOIL06, ID BOIL07, ID BOIL08, ID BOIL09

The facility will perform semiannual visual checks for opacity when burning No. 2 fuel oil.

Sulfur Dioxide Emissions (Section III) – The following boilers are subject to the 2.3 lb/million Btu SO₂ limit: ID BOIL01, ID BOIL02, ID BOIL06, ID BOIL07, ID BOIL08, ID BOIL09.

The emission factor for these boilers' worst-case fuel (No. 2 fuel oil) is 0.0015 lb/million Btu. No additional monitoring is required.

Opacity Monitoring and Periodic Testing (Sections IV and VI)

Sections IV and VI of Standard No. 1 specify requirements for opacity monitoring and periodic testing, respectively. The boilers are not subject to the opacity monitoring requirements in Section IV since each has a maximum rated heat input of less than 250 million Btu/hr. Section VI is not applicable because the boilers are less than 250 million Btu/hr and will use only natural gas/No. 2 fuel oil as fuel.

Not Applicable - Standard No. 3 (state only) (Waste Combustion and Reduction)

There are no waste combustion processes at this facility.

Applicable - Standard No. 4 (Emissions from Process Industries)

Emission Unit IDs 26, 27, 28, 29, 30, 34, 36 are subject to the PM and Opacity emission limitation of Standard 4. Additionally, remaining units that do not emit particulate matter are subject to Section IX and a 20% opacity limit if installed after December 31, 1985 and 40% if installed December 31, 1985.



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Process	Max Process Weight Rate (tons/hr)	PM Allowable at Max (lb/hr)	Uncontrolled Emissions PM (lb/hr)	Controlled Emissions PM (lb/hr)	Monitoring
EU 26 – East Plant Fermentation	1.13	4.45	0.11	--	None: Uncontrolled PM emissions are less than the allowable emission rate for each process
EU27 – Phase I Fermentation	1.19	4.61	0.12	--	None: Uncontrolled PM emissions are less than the allowable emission rate for each process
EU28 – Phase II Fermentation	1.19	4.61	0.12	--	None: Uncontrolled PM emissions are less than the allowable emission rate for each process
EU29 – West Plant Fermentation	0.33	1.95	3.01	0.30	Controlled by ID C-20: Continue to maintain pressure drop gauges and shall be recorded daily
EU30 – Spray Drying	1.20	4.63	166.0	1.25	CAM Monitoring
EU34 - RBD	1.105	4.38	0.03	0.0003	None: Uncontrolled PM emissions are less than the allowable emission rate for each process
EU36 – Fluid Bed Granulator	2.27	7.10	10.0	0.05	Controlled by ID B104: Continue to maintain pressure drop gauges and shall be recorded daily



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Not Applicable - Standard No. 5 (Volatile Organic Compounds)

This facility does not operate or have any of the processes described under the various parts of this regulation.

Applicable - Standard No. 5.2 (Control of Oxides of Nitrogen (NO_x))

The 49.28 million Btu/hr boiler (ID BOIL09) will burn natural gas and No.2 Fuel Oil as fuel, and will be subject to the NO_x emission limit of 0.036 lb/million BTU for natural gas and 0.15 lb/million BTU for No.2 fuel oil of this standard.

ID BOIL01, ID BOIL02, ID BOIL06, ID BOIL07, and ID BOIL08 were permitted to construct before July 25, 2004 and burners have not been replaced. Each boiler meets the definition of an existing source and has no requirements under this Standard.

Applicable - Standard No. 7 (Prevention of Significant Deterioration)

This facility is part of the food processing industry and is not one of the 28 source categories subject to the 100.0 tpy PSD major source threshold. Therefore, it would be subject to the 250.0 tpy major source threshold. The facility has existing PSD avoidance limits for PM₁₀, PM_{2.5}, SO₂, NO_x, and VOCs that will be retained as part of this renewal.

PSD Limits					
Permit ID	Equipment ID	Permit Issue Date	Pollutant	Emission Limit (TPY)	Explanation
2320-0001-CR	Facility-Wide	2/18/04	PM ₁₀ /PM _{2.5}	<100.0	PSD Avoidance
2320-0001-CR	Facility-Wide	2/18/04	NO _x	<100.0	
Cond. Major	Facility-Wide	1/04/01	SO ₂	<100.0	
2320-0001-CU	Facility-Wide	12/1/04	VOC	<250.0	

Applicable - 61-62.6 (Control of Fugitive Particulate Matter)

The facility will be subject to the state-wide fugitive emissions requirements of Section III.

40 CFR 60 and 61-62.60 (New Source Performance Standards (NSPS))

Applicable - Subpart Dc (Standards of Performance for Small Industrial Commercial Institutional Steam Generating Units)

This regulation applies to fossil-fuel-fired, or fossil-fuel and wood-residue fired steam generating units for which construction, modification or reconstruction is commenced after June 9, 1989 and that has a maximum design heat input capacity of 100 million BTU/hr or less, but greater than or equal to 10 million BTU/hr. Boilers IDs BOIL06, BOIL07, BOIL08, and BOIL09 burns natural gas and No. 2 fuel oil as backup and have construction dates after June 9, 1989. These boilers are subject to this subpart.



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Not Applicable - Subpart Kb (Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) For Which Construction, Reconstruction, or Modification Commenced After July 23, 1984)

This regulation lists performance standards specifically for liquid storage vessels containing volatile organics. The standard is not applicable to this facility since all storage tanks are below the capacity threshold, below the vapor pressure threshold, or installed before the effective date of this regulation.

40 CFR 61 and 61-62.61 (National Emission Standards for Hazardous Air Pollutants (NESHAP))

Not Applicable - This facility does not emit the pollutants in a way that is subject to this standard (asbestos, benzene, beryllium, coke oven emissions, arsenic, mercury, radio nuclide, radon, or vinyl chloride).

40 CFR 63 and 61-62.63 (National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories)

Not Applicable - Subpart FFFF (National Emission Standards for Organic Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing)

This subpart applies to organic chemical manufacturers operating at major sources of HAP emissions. DSM is not considered a major source of HAPs and therefore, DSM is not subject to this rule.

Not Applicable - Subpart DDDDD (National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial and Institutional Boilers and Process Heaters)

This regulation applies to boilers operated at major sources of HAP emissions. Since this facility is not considered a major source of HAP emissions, this regulation does not apply.

Not Applicable - Subpart JJJJJ (National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources)

This regulation applies to boilers operated at area sources of HAP emissions. This facility is classified as an existing area source for classification under this regulation. 40 CFR Part 63.11195 states that "Gas-fired Boilers" are not subject to this regulation. Under 40 CFR Part 63.11237, a "Gas-fired Boiler includes any boiler that burns gaseous fuels not combined with any solid fuels, burns liquid fuel only during periods of gas curtailment, gas supply emergencies, or periodic testing on liquid fuel. Periodic testing of liquid fuel shall not exceed a combined total of 48 hours during any calendar year." The facility only uses fuel oil during periods of gas curtailment, gas supply emergencies, or periodic testing on liquid fuel. Since all of the boilers are classified as "Gas-fired Boilers," this regulation is not applicable.

Not Applicable - Subpart VVVVV (National Emission Standards for Hazardous Air Pollutants for Chemical Manufacturing Area Sources)

The Chemical Manufacturing area source NESHAP applies to operations at chemical manufacturing facilities that utilize a HAP listed in Table 1 of the Subpart VVVVV rule. The facility does not utilize any of these HAPs; and therefore, this subpart does not apply.

Not Applicable - Subpart BBBB (National Emissions Standards for Hazardous Air Pollutants for Area Sources: Chemical Preparations Industry)

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The Chemical Manufacturing area source NESHAP applies to operations at chemical manufacturing facilities that utilize a HAP listed as a target HAP (chromium, lead, manganese, and nickel) under the Subpart BBBBBBB rule. Since the processes do not utilize any of these HAPs, they are not subject to this regulation.

Applicable - Subpart ZZZZ (National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)

This subpart applies to internal combustion engines operated at a facility that is either a major or area source of HAP emissions. The facility is classified as an existing area source for classification under this regulation (installed before June 12, 2006); therefore, the emergency generators and fire pump engine must comply with the requirements of this subpart for an existing area source.

Not Applicable - 61-62.68 (Chemical Accident Prevention Provisions)

The facility does not use or store chemicals subject to 112(r) in quantities above their threshold amounts.

Applicable - 40 CFR 64 (Compliance Assurance Monitoring)

Compliance Assurance Monitoring (CAM) applies to a pollutant specific emission unit (PSEU) at a major source that applies to the following:

- 1) That unit is subject to an emission limitation or standard for the applicable regulated air pollutant.
- 2) The unit uses a control device to achieve compliance with any such emission limitation or standard.
- 3) The unit has potential pre-control device emissions or potential to emit (PTE) of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source.

Equipment IDs DR-250, DR-251, PC1, and PC2 are applicable to CAM requirements as they are subject to S.C. Standard No. 4 and have pre-control device emissions exceeding the major source threshold of 100 tpy for PM. IDs DR-250 and DR-251 are controlled by a cyclone and venturi scrubber, while IDs PC1 and PC2 are controlled by dust collectors. The pressure drop is recorded once per day instead of averaging multiple data points as described in §64.3(b)(4)(ii). This frequency of data collection of once per day is the minimum allowed if post-control emissions are less than the major source threshold according to document titled "FAQs Concerning the CAM Rule." §64.3(b)(4)(iii) further justifies this allowance of PSEU data collection frequency being less than that described by §64.3(b)(4)(ii), but still requires some data collection at least once per 24-hour period. See the CAM plan submitted March 2012 for details.

Equipment ID	Control Device ID/ Description	Standard 4 Limit	Uncontrolled PM Emissions
DR-250	WSS1/Venturi Scrubber with Wet Cyclone	4.63 lb/hr	60 lb/hr (263 TPY)
DR-251	WSS2/Venturi Scrubber with Wet Cyclone	4.63 lb/hr	60 lb/hr (263 TPY)
PC1	PB1 / Baghouse	4.63 lb/hr	22.8 lb/hr (100 TPY)
PC2	PB2 / Baghouse	4.63 lb/hr	22.8 lb/hr (100 TPY)

AMBIENT AIR STANDARDS REVIEW

Applicable - Standard No. 2 (Ambient Air Quality Standards)

Compliance was demonstrated through modeling on 7/02/24.



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Applicable - Standard No. 8 (state only) (Toxic Air Pollutants)

Compliance was demonstrated through modeling on 7/02/24.

PERIODIC MONITORING					
ID	Regulatory Requirement	Measured Parameter	Required Monitoring Frequency	Reporting Frequency	Monitoring Basis/ Justification
DR-250 WSS1	40 CFR 64	Pressure Drop	Recorded once per day	Semi-annual	Standard No. 4
DR-251 WSS2	40 CFR 64	Pressure Drop	Recorded once per day	Semi-annual	Standard No. 4
PC1 PB1	40 CFR 64	Pressure Drop	Recorded once per day	Semi-annual	Standard No. 4
PC2 PB2	40 CFR 64	Pressure Drop	Recorded once per day	Semi-annual	Standard No. 4
BOIL09	40 CFR 60 Subpart Dc	Fuel Records	Daily	Semi-annual	§60.48c

PUBLIC NOTICE

This Title V Permit will undergo a 30-day public notice period and a 45-day EPA comment period in accordance with SC Regulation 61-62.1, Section II(N) and SC Regulation 61-62.70.7(h).

SUMMARY AND CONCLUSIONS

It has been determined that this source, if operated in accordance with the submitted application, will meet all applicable requirements and emission standards.