4500 Brooktree Road | Suite 103 | Wexford, PA 15090 | P (724) 935-2611 | F (724) 935-2622
trinityconsultants.com

Trinity Consultants

November 1, 2016

Ms. Bev McKeone
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street SE
Charleston, WV 25304

RE: Regulation 14 Class II Administrative Update Application
Knauf Insulation
Inwood, WV Facility

Dear Ms. McKeone:

On behalf of Knauf Insulation LLC (Knauf), Trinity Consultants (Trinity) is submitting the enclosed permit application for proposed changes at Knauf's wool fiberglass insulation facility in Inwood, WV. There are two hard copies of the permit application (one each for the NSR and Title V permitting programs) as well as two CDs.

The application contains attachments for both NSR and Title V permit processing. The legal notice will be published in *The Journal* and proof of publication will follow under separate cover.

If you have any questions or comments about the information presented in this letter, please do not hesitate to call me at (724) 935-2611.

Sincerely,

TRINITY CONSULTANTS

Tom Muscenti
Manager of Consulting Services

cc: Mr. Chris Mahin (Shelbyville)

R14 PERMIT APPLICATION

Knauf Insulation, LLC > Inwood Facility

Permit No. R30-003000012-2013

Prepared By:

TRINITY CONSULTANTS
4500 Brooktree Rd.
Suite 103
Wexford, PA 15090
(724) 935-2611

November 2016

Project 153901.0131

Trinity Consultants

Environmental solutions delivered uncommonly well

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Knauf Insulation, LLC (Knauf) operates a fiberglass roll and batt insulation manufacturing facility in Inwood, West Virginia (Inwood facility). The facility currently operates in accordance with West Virginia Department of Environmental Protection (WVDEP) Division of Air Quality Title V operating permit R30-00300012-2013, issued on September 20, 2013 and most recently modified on March 15, 2016.

Knauf is submitting this Rule 14 (R-14) permit application to the West Virginia Department of Environmental Protection (WVDEP) to upgrade production operations on Line 2 at the Inwood Facility. As such, Knauf will install a new gas oxygen-fueled (gas-oxy) melting furnace and upgrade the canal/channel and forehearth, fiber forming equipment, and packaging equipment. The project also involves modification of the existing curing oven and glass raw material handling and storage facilities and calls for the installation of a new emergency generator.

1.1. FACILITY AND PROJECT DESCRIPTION

Knauf's Inwood facility is a wool fiberglass manufacturing facility covered under Standard Industrial Classification (SIC) Code 3296 and North America Industry Classification (NAICS) Code 327993. The facility has the potential to operate 24 hours per day, 7 days per week. The facility consists of a raw materials receiving area and batch mixing point, electric melters, a series of natural gas fueled heaters, binder sprayers, curing ovens, and storage tanks. The facility also consists of two production lines: Line 1 and Line 2.

With respect to this project Line 2 at the Inwood facility will produce only one insulation type, a bonded product. The facility receives raw materials that are mixed into batch and the batch is then melted to form molten glass. The molten glass is separated into streams by use of a forehearth and fiber is spun into strands by the means of fiberizers. In bonded fiberglass production, the fine fibers are transferred to a fiber forming section where water, wax and ECOSE binder are added and are collected to form a binder coated fiber blanket, which is then cured in an oven. Upon exiting the curing oven the blanket is cooled via a "cooling table". The cooled blanket is then cut to size in rolls and batts of insulation per customer demand and packaged for shipment offsite. Wet scrubbers, an air tumbler, dust collectors and cyclones are used to control emissions at various points in the process.

Knauf is planning to increase production on Line 2 by upgrading or replacing previous line equipment. The proposed project will increase the processing capacity of Line 2 to 160 tons/day (13,333 pounds per hour) of glass pulled.

Detailed descriptions of the proposed changes to each portion of the process as a result of the proposed project are provided in the following section.

1.2. PROPOSED PROJECT UPDATES

1.2.1. Raw Material Handling Operations (Group 001)

The raw material operations consists of several storage bins for sand, aplite, borax, soda ash, cullet, batch houses which receive and mix the raw materials, and several miscellaneous binder mixing tanks. In addition to the increase in production on Line 2, Knauf is also replacing two day bins, with dedicated bins vents (CD11A and CD11B), adding new cullet silos and replacing some of the conveyance equipment within the process.

1.2.2. Melt and Refining Line 2 (Group 003)

Knauf Inwood facility will install a new gas oxygen fueled melting furnace (ESS22) with a glass pull rate of 13,333 lb/hr (58,400 tons per year). The proposed equipment is considered a continuous furnace with a melting tank, a superstructure (combustion chamber), a throat (connection between the melting end and the riser that brings the molten glass in the refiner, working end or distributor), a working chamber, and different heat exchangers. Moreover,

Knauf is also planning to upgrade the forehearth in the refining line to handle the new capacity and throughput of the production line. The new melter will be served by a new baghouse (CD22B) and the exhaust gas will ultimately pass to the new EP23 stack.

1.2.3. Forming and Collecting Line 2 (Group 005)

The existing forming/collection section (ES23) on Line 2 will be modified as a result of this project. There will be four forming/ fan zones and multiple cured product fiberizers fired with natural gas (Total rating at 20 MMBtu/hr). The forming and collecting section will be controlled with a fiber collection chamber that includes wet collection.

1.2.4. Curing and Cooling Line 2 (Group 007)

As part of this project, Knauf will be modifying the Line 2 curing oven as well as increasing the potential throughput for the process. The resulting curing oven (part of ES24) will have five (5) zones and will have 2 oven vestibule burners. The maximum total heat input rating for the process will be 25.2 MMBtu/hr. No changes to the cooling section are envisioned at this time apart from the increase in production. The process will be primarily controlled by a wet (i.e., venturi) scrubber for particulate matter. Note that the current permit also includes a regenerative thermal oxidizer (RTO) on Line 2 curing and cooling. The RTO is used primarily for control of volatile organic compounds (VOCs). However, due to process changes, including formulation changes, Knauf anticipates being able to meeting existing permit limits without use of the RTO. As such, Knauf is requesting the preservation of the RTO in facility permits, but anticipates only operating the device in the event that it is deemed necessary to meet process emission limits.

1.2.5. Facing, Sizing and Packaging for Line 2 (Group 8)

Knauf is proposing to upgrade its existing packaging and product handling operations for Line 2. These upgrades include the installation of two 15,000 acfm cyclones and cartridge filters. This will replace the existing 20,000 acfm unit.

1.2.6. Additional Support Facilities

In addition to the changes to the existing processes at the facility, Knauf is also proposing installation of the following new equipment:

- One (1) 900 brake horsepower (bhp) Caterpillar C18 emergency generator; and
- Three (3) cooling towers each with a water recirculation rate of approximately 2,412 gallons per minute (gpm).

1.3. R-14 APPLICATION ORGANIZATION

This R-14 permit application is organized as follows:

- Section 2: Project Emissions Calculations;
- Section 3: Best Available Control Technology Review;
- Section 4: R-14 Application Forms;
- Attachment A: Current Business Certificate;
- Attachment B: Map;
- Attachment C: Start Up and Installation Schedule;
- Attachment D: Regulatory Discussion;
- Attachment E: Plot Plan;
- Attachment F: Detailed Process Flow Diagram;
- Attachment G: Process Description;
- Attachment I: Emission Units Table;
- Attachment J: Emission Points Data Summary Sheet;
- Attachment K: Fugitive Emissions Data Summary Sheet;
- Attachment L: Emissions Unit Data Sheet;
- Attachment M: Air Pollution Control Device Sheet;
- Attachment N: Supporting Emission Calculations;
- Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans;
- Attachment P: Legal Advertisement;
- Attachment S: Title V Revisions Information; and
- Application Fee.

Emission increases from the proposed project were calculated in accordance with the procedures described in West Virginia Code of State Regulations (CSR) 45 CSR 14 subsection 3.4. The procedures can be summarized as follows:

- Subdivision 3.4.c – An actual-to-projected actual applicability test for projects that only involve existing emissions units;
- Subdivision 3.4.d – An actual-to-potential test for projects that only involve construction of new emissions units; and
- Subdivision 3.4.f – A hybrid test for projects that involve multiple types of emission units using the relevant calculation method outlined in Subdivision 3.4.c and 3.4.d for existing and new sources, respectively.

Per 45 CSR 14 Subdivision 3.4.f, "a significant emissions increase of a regulated New Source Review (NSR) pollutant is projected to occur if the sum of the emissions increases for each emissions unit, using the method specified in subdivisions 3.4.c through 3.4.d as applicable with respect to each emissions unit, for each type of emissions unit equals or exceeds the significant amount for that pollutant."

Note that with respect to emissions of hazardous air pollutants (HAP) Knauf is expecting substantial decreases due to process changes including formulation. In particular, the plant's binders will be a non-phenol/formaldehyde binder. There is no HAP emissions information with respect to this binder (i.e., levels are expected to be negligible, if not zero).

2.1. BASELINE ACTUAL EMISSIONS

Pursuant to 45 CSR 14 subsection 2.8, Baseline Actual Emissions (BAE) must be calculated to cover a 24-month period within the ten-year period preceding receipt of a complete permit application. In addition, for a new emissions unit the BAE for determining emissions increases that will result from the initial construction is equal to zero. Based on this definition of BAE, and assuming determination of receipt of a complete permit application no later than the end of 2016, the BAE were calculated using the period from 2007 to 2016 for existing emission units. BAE were calculated using actual throughput rates for the applicable baseline years, per the emission inventory report for each year included in the baseline period. Emission factors for each pollutant were developed from testing at the Inwood Facility in various years from 2000 through 2016 as utilized in emissions inventory reporting. The period from 2007 through 2008 was used to calculate the all the pollutants baseline emissions for all existing units. For new units (e.g., new melter, new generator, etc.), the baseline emissions were set to zero.

2.2. PROJECTED ACTUAL EMISSIONS

45 CSR subsection 2.63 states that to determine projected actual emissions (PAE) of a project, the calculations:

- Shall consider all relevant information, including but not limited to, historical operational data, the company's own representations, the company's expected business activity and the company's highest projections of business activity, the company's filings with the State or Federal regulatory authorities, and compliance plans under the approved State Implementation Plan; and
- Shall include fugitive emissions to the extent quantifiable, and emissions associated with startups, shutdowns, and malfunctions; and
- Shall exclude, in calculating any increase in emissions that results from the particular project, that portion of the unit's emissions following the project that an existing unit could have accommodated during the consecutive 24- month period used to establish the baseline actual emissions and that are also unrelated to the particular project, including any increased utilization due to product demand growth

The project basis is to upgrade Knauf's Line 2 wool fiberglass production process. The emission rates for the modified existing equipment are expected to differ from those for the old operating equipment configuration. As such, to

calculate projected actual emissions, the emission factors for the curing, cooling, forming, and collection areas on Line 2 were based on Knauf Technology binder emission factors at other facilities.

Projected actual emissions are calculated using the projected throughput for Line 2 (13,333 lb/hr at continuous operation). Emissions were calculated for the entire production process (i.e., including raw material handling and other associated operations) to include associated emission increases from the proposed project. Detailed calculations of projected actual emissions, including consideration of exclusion of emissions that could have been accommodated and that are also unrelated to the project, are provided in Attachment N.

2.3. POTENTIAL EMISSIONS

45 CSR subsection 2.58 states that potential emissions are the "maximum capacity of a stationary source to emit a pollutant under its physical and operational design." Based on the requirement to utilize potential emissions in the emissions increase calculation for new sources, potential emissions were computed for the new melter, new emergency generator, three (3) new cooling towers, two (2) new batch day bins, and new control for the sizing and packaging area. Emissions were based on a variety of sources including U. S. Environmental Protection Agency (U.S. EPA) AP-42 Emissions factors, proposed limits and manufacturer data (new generator).

2.4. PROJECTED EMISSIONS INCREASE

The emissions increase for existing emissions sources is determined by the difference between the baseline actual emissions and the expected new level of emissions, which takes into account demand growth exclusion (DGE).

The project emissions increase (PEI) in the format of a formula is then:

PEI = (PAE – DGE) – BAE

Where:

PEI = Net Emission Increase
PAE = Projected Actual Emissions
DGE = Demand Growth Exclusion
BAE = Baseline Actual Emission Rates

As discussed previously, for new emissions sources future emissions are based on potential to emit and baseline actual emissions are set equal to zero. As such, the project increase for new emission units is equal to the proposed potential to emit.

A summary of the analysis, compared to the PSD significant emission rates (SERs) is included in Table 2-1, with detailed supporting calculations provided in Attachment N. Emission increases for the proposed project are above the applicable NSR major threshold for nitrogen oxides (NO_X), particulate matter (PM), particulate matter with a diameter less than 10 microns (PM_{10}), and particulate matter with a diameter less than 2.5 microns ($PM_{2.5}$). As such, PSD permitting is triggered by the proposed project for these pollutants only. Attachment D explains in detail the requirements to be in compliance with federal and state regulations.

Table 2-1. Project Emissions Increase Summary

Project Emissions Increases											
Pollutant	**Raw Material Handling**	**Furnace**	**Forming**	**Curing and Cooling**	**Facing, Sizing, Packaging**	**Generator**	**Roads**	**Cooling Towers**	**Total**	**Significant Emission Rate (tpy)**	**Above Significant Emission Rate?**
NO_X	--	87.6	5.3	6.2	--	3.1	--	--	102.2	40	Yes
CO	--	15.2	0.0	32.6	--	0.4	--	--	48.2	100	No
PM	0.1	7.3	50.0	23.4	2.9	0.04	3.3	0.6	87.6	25	Yes
PM_{10}	0.03	7.3	68.8	29.9	2.9	0.04	0.8	0.5	110.2	15	Yes
$PM_{2.5}$	0.03	7.3	68.8	29.9	2.9	0.04	0.1	0.002	109.0	10	Yes
VOC	--	5.7	10.0	10.4	7.6	0.04	--	--	33.7	40	No
SO_2	--	22.8	0.7	0.8	--	0.1	--	--	24.4	40	No
CO_2e	1,642	13,438	6,071	5,074	--	233	--	--	26,459	75,000	No

3. BEST AVAILABLE CONTROL TECHNOLOGY EVALUATION

Knauf's Inwood facility is considered an existing major source. The proposed project will result in a major modification due to the significant net emissions increase for NO_X, PM, $PM_{2.5}$ and PM_{10}. As such, an analysis to ensure implementation of the Best Available Control Technology (BACT) is required for each pollutant with a significant net emissions increase. A technical review has been performed to investigate BACT evaluations for the mentioned pollutants that have recently been determined by various permitting authorities across the U.S. to satisfy BACT requirements. This project will not be subject to Least Achievable Emission Rate (LAER) requirements as no pollutants trigger NNSR permitting.

3.1. METHODOLOGY

In the 1977 Amendments to the federal Clean Air Act (CAA), Congress enacted a program for the PSD regulations defining the requirements that a state must meet if that state chooses to adopt and obtain U.S. EPA approval of a PSD program (42 U.S.C. §§7410(a)(2)(D), 7471). Among the PSD requirements imposed, the state must require any proposed major emitting facility subject to the PSD program to apply BACT for each pollutant subject to regulation under the CAA that the source emits in a significant amount (42 U.S.C. §§7475(a)(4)). Under the CAA, BACT limits are to be determined on a case-by-case basis after taking into account energy, environmental, and economic impacts and other costs (42 U.S.C. §§7479(3)). West Virginia has a U.S. EPA approved PSD program, pursuant to a U.S. EPA approved SIP.

West Virginia air quality regulations require that BACT be applied to major modifications for each pollutant with a significant net emission increase. The definition of "significant" is pollutant specific and is found in West Virginia regulations as summarized under §45-14-2.74.a. The net emissions increase for NO_X, PM, $PM_{2.5}$ and PM_{10} exceeds the SERs as noted in previous sections, thereby triggering the requirement for BACT review.

In a memorandum dated December 1, 1987, U.S. EPA stated its preference for a "top-down" analysis for BACT review.[1] The first step in this approach is to determine, for the emission unit in question, the most stringent control available for a similar or identical source or source category. If it can be shown that this level of control is technically, environmentally, or economically infeasible for the unit in question, then the next most stringent level of control is determined and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any substantial or unique technical, environmental, or economic objections. Presented below are the five basic steps of a top-down BACT review as identified by the U.S. EPA.

> **Step 1 – Identify All Control Technologies**

Available control technologies with the practical potential for application to the emission unit and regulated air pollutant in question are identified. Available control options include the application of alternate production processes and control methods, systems, and techniques including fuel cleaning and innovative fuel combustion, when applicable. The application of demonstrated control technologies in other similar source categories to the emission unit in question can also be considered. While identified technologies may be eliminated in subsequent steps in the analysis based on technical and economic infeasibility or

[1] Improving New Source Review (NSR) Implementation, J. Craig Potter.

environmental and energy impacts, control technologies with potential application to the emission unit under review are identified.

The following resources are typically consulted when identifying potential technologies:

1. EPA's Reasonably Available Control Technology (RACT)/Best Available Control Technology (BACT)/Lowest Achievable Emission Reduction (LAER) Clearinghouse (RBLC) database;
2. Determinations of BACT by regulatory agencies for other similar sources or air permits and permit files from federal or state agencies;
3. Previous engineering experience with similar control applications;
4. Information provided by air pollution control equipment vendors with significant market share in the industry; and/or
5. Review of literature from industrial technical or trade organizations.

> **Step 2 – Eliminate Technically Infeasible Options**

After the available control technologies have been identified, each technology is evaluated with respect to its technical feasibility in controlling the PSD-triggering pollutant emissions from the source in question. An undemonstrated technology is only technically feasible if it is "available" and "applicable." A control technology is only considered available if it has reached the licensing and commercial sales phase of development. Control technologies in the R&D and pilot scale phases are not considered available. Based on EPA guidance, an available control technology is presumed applicable if it has been permitted or actually implemented by a similar source. Decisions about technical feasibility of a control option consider the physical or chemical properties of the emissions stream in comparison to emissions streams from similar sources successfully implementing the control alternative.

> **Step 3 – Rank Remaining Control Technologies by Control Effectiveness**

Once technically infeasible options are removed from consideration, the remaining options are ranked based on their control effectiveness. If there is only one remaining option or if all of the remaining technologies could achieve equivalent control efficiencies, ranking based on control efficiency is not required.

> **Step 4 – Evaluate Most Effective Controls and Document Results**

Beginning with the most efficient control option in the ranking, detailed economic, energy, and environmental impact evaluations are performed. If a control option is determined to be economically feasible without adverse energy or environmental impacts, it is not necessary to evaluate the remaining options with lower control efficiencies.

> **Step 5 – Select BACT**

In the final step, the BACT emission limit is determined for each emission unit under review based on evaluations from the previous step.

Although the first four steps of the top-down BACT process involve technical and economic evaluations of potential control options (i.e., defining the appropriate technology), the selection of BACT in the fifth step involves an evaluation of emission rates achievable with the selected control technology. BACT is an emission limit unless technological or economic limitations of the measurement methodology would make the imposition of an emissions standard infeasible, in which case a work practice or operating standard can be imposed.

For this project, the units subject to BACT review are raw material handling operations (Group 001), melt and refining Line 2 (Group 002), forming and collecting Line 2 (Group 004), curing and cooling Line 2 (Group 006), cooling towers and the emergency engine generator.

3.2. SELECTED BACT SUMMARY

Table 3-1 below lists the selected best available control technology per emission unit and pollutant, the corresponding emission or operating limits, and the method that will be used to determine compliance with the specified limit. The BACT emission limits are per emission unit.

Note that melting furnace startup and shutdown occurrences will occur on an infrequent basis and will not typically have an impact on emissions above normal production emissions. The startup will involve a pre-heat stage where only natural gas combustion is exhausting through a bypass, then through the baghouse fan and out the stack. Once operational temperatures are reached and raw materials (batching) are fed into the melter, the bypass will be isolated and the baghouse will be online. Once the melter is online and batches are fed into the melter, other processes such as forming and collection and curing and cooling will initiate operation. Controls for these equipment will be online prior to operation of this processes.

Knauf reviewed the current RBLC database. It is worth noting that in the past 10 years, no new entries have been made in the fiberglass insulation category. Additionally, previous entries have been based on an older, phenol-formaldehyde resin based technology. This technology is being replaced at the Inwood facility with newer and lower VOC/HAP emitting technology. Knauf is proposing to install controls that meet or exceed established industry performance standards based on the new technology.

Table 3-1. Selected BACT Summary

Group	Pollutant	Selected Control	BACT Emission/ Operating Limit	Compliance Method
Raw Material and Handling Operations (Common Stack EP23)	$PM_{10}/PM_{2.5}$	Baghouse	0.07 lb/hr (Line 2 portion)	Vendor Guarantee
	PM	Baghouse	0.15 lb/hr (Line 2 portion)	Vendor Guarantee
Facing, Sizing and Packaging (Common Stack EP23)	$PM/PM_{10}/PM_{2.5}$	Baghouse	0.64 lb/hr (for baghouse)	Vendor Guarantee
Melt and Refining Line 2 Operations (Common Stack EP23)	NO_X	Good Combustion Practices	3.00 lb/ton of glass pulled	Method 7 or 7E
	$PM_{10}/PM_{2.5}$ + CPM	Baghouse (for filterable)	0.25 lb/ton of glass pulled	Method 201or 201A and Method 202
	PM filterable	Baghouse	0.25 lb/ton of glass pulled	Method 5
Forming and Collecting Line 2 Operations (Common Stack EP23)	NO_X	Good Combustion Practices	0.21 lb/ton of glass pulled	Method 7 or 7E
	$PM_{10}/PM_{2.5}$ + CPM	Design + Wet Collection	3.21 lb/ton of glass pulled	Method 5E
	PM filterable	Design + Wet Collection	2.57 lb/ton of glass pulled	Method 5
Curing and Cooling Line 2 Operations	NO_X	Good Combustion Practices and Low NO_x Burners	0.59 lb/ton of glass pulled	Method 7 or 7E
	$PM_{10}/PM_{2.5}$ + CPM	Wet Scrubber + Design	1.1 lb/ton of glass pulled	Method 5E
	PM filterable	Wet Scrubber + Design	0.88 lb/ton of glass pulled	Method 5
New Emergency Generator	NO_X	Tier II engine + Limit on Hours of Operation	Tier II standards + 500 hours of operation	Manufacture info and Records of hours of operation
	$PM_{10}/PM_{2.5}$ + CPM			
	PM filterable			
Cooling Towers	$PM_{2.5}$	Drift Eliminator	0.005 % drift	Manufacturer info
	PM_{10}	Drift Eliminator	0.005 % drift	Manufacturer info
	PM	Drift Eliminator	0.005 % drift	Manufacturer info

3.3. NO_X BEST AVAILABLE CONTROL TECHNOLOGY

There are three types of chemical kinetic processes that form NO_X emissions from processes such as fiber glass production. The NO_X emissions from these chemical mechanisms are referred to as: 1) thermal NO_X, 2) fuel NO_X, and 3) prompt NO_X. For all practical purposes, prompt NO_X is not important in the fiber glass process, since prompt NO_X forms mainly in low-temperature, fuel rich conditions. Thermal NO_X is generated by the oxidation of nitrogen (N_2) in the air as it passes through the flames. This reaction requires high temperatures, hence the name thermal NO_X. The formation of nitrogen oxide (NO) from oxygen (O_2) and N_2 in air at high temperatures is described by the well-known Zeldovich mechanism. Fuel NO_X is the result of the conversion of nitrogen contained in fuels to NO_X during fuel combustion. In the fiber glass production operations, due to the high temperatures involved, thermal NO_X is the predominant mechanism of NO_X formation from the fiber glass manufacturing process. For this fiberglass facility, the units subject to BACT review are melt and refining Line 2 (Group 003), forming and collecting Line 2(Group 005), curing and cooling Line 2(Group 007), and the emergency generator.

3.3.1. Melt and Refining Handling Operations (Group 003)

Identification of Potential Control Technologies (Step 1)

Candidate control options identified from the RBLC search and the literature review include those classified as add-on controls and pollution reduction techniques. NO_X reduction options include:

- Selective Catalytic Reduction (SCR)
- Selective Non-Catalytic Reduction (SNCR)
- Non-Selective Non-Catalytic Reduction (NSNCR)
- Gas-Oxy Burner
- Indirect Firing Low-NOX Burner (LNB)
- Good Combustion Techniques

These control technologies are briefly discussed below.

Selective Catalytic Reduction

Selective catalytic reduction (SCR) is a post-combustion gas treatment process in which ammonia (NH_3) is injected into the exhaust gas upstream of a catalyst bed. On the catalyst surface, ammonia and nitric oxide react to form diatomic nitrogen and water vapor. The overall chemical reaction can be expressed as:

$$4NO + 4NH_3 + O_2 \rightarrow 4N_2 + 6H_2O$$

When operated within the optimum temperature range (approximately 480 to 800°F), the reaction can result in removal efficiencies between 70 to 90 percent.[2] SCR units have the ability to function effectively under fluctuating temperature conditions although fluctuation in exhaust gas temperature reduces removal efficiency slightly by disturbing the NH_3/NO_X molar ratio. SCR can be used to reduce NO_X emissions from combustion of natural gas and light oils (e.g., distillate). Combustion of heavier oils can produce high levels of particulate, which may foul the catalyst surface, reducing the NO_X removal efficiency.

[2] https://www3.epa.gov/ttncatc1/dir1/fscr.pdf, EPA-452/F-03-032 Air Pollution Control Fact Sheet

Selective Non-Catalytic Reduction

SNCR uses ammonia (NH_3) or a urea solution, injected into the gas stream, to chemically reduce NO_X to form N_2 and water. High temperatures, optimally between 1,600 to 2,400°F for urea injection[3], promote the reaction via the following equation:

$$NH_3 + NO + {}^1/_4\, O_2 \rightarrow N_2 + {}^3/_4\, H_2O$$

At temperatures below the optimal range, unreacted ammonia can pass through the SNCR and be emitted from the stack (known as "ammonia slip"). At temperatures above the range, ammonia may be combusted, generating additional NO_X. In addition, an effective mixing of gases and entrainment of the reductant into the exhaust gases at the injection point is a critical factor in ensuring an efficient reaction. SNCR usually achieves NO_X reduction of 51-70%.

Gas-Oxy Burner

Gas-oxy burners increase furnace efficiency by improving thermal efficiency and heat transfer, while reducing NO_X emissions through a reduction in nitrogen entering the combustion process. It is estimated that gas-oxy burners reduce the available amount of nitrogen for NO_x conversion by about 70%.

Low-NO_X Burner (LNB)

Low-NO_x Burner is a multi-channel burner that creates primary and secondary combustion zones. The primary zone is fuel rich and oxygen deficient creating less NO_X. Secondary zone is oxygen rich and operates at a lower temperature where combustion is completed. The design reduces the concentration of NO_X by improving mixing of the primary air-fuel stream.

Good Combustion Techniques

Good combustion techniques include oxygen control, process design, and optimized process control. Examples include homogenization of fuel and raw materials, heating rate, less excess air, flame position, length, and temperature. Computer-based automated controls and gravimetric solid fuel feed systems also optimize combustion parameters, allowing for less fuel use and thermal NO_X production.

Elimination of Technically Infeasible Control Options (Step 2)

Some control options have specific operating conditions that are required in order for the control technique to properly reduce NO_X emissions. For a given the type of process, some of the operating conditions are not present and would either require additional equipment or cannot be achieved. If the operating conditions cannot be achieved, then the control technology is considered technically infeasible and is removed from the BACT analysis. The following is a feasibility discussion on the aforementioned technologies for the melting furnace equipment.

The proposed gas oxygen fueled melting furnace is a direct fired unit whose exhaust is directed to EP23. The temperature of the exhaust at this point is 140°F. These operating conditions limit the viability to implement certain control technologies. SNCR is technically infeasible since the exhaust temperature is significantly lower than the required operating temperature of the control devices (1,600-2,400°F) and as such, has not been demonstrated in the industry. Even if the temperature of the exhaust was raised with a large boiler, the emissions of the boiler unit would surpass the NO_x emission savings.

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[3] Air Pollution Control Cost Manual, Section 4.2, Chapter 1, Selective Non-Catalytic Reduction, NO_X Control, EPA/452/B-02-001, Pages 1-7 to 1-8.

SCR has the same technological challenge but with a lower operating temperature (~700°F). As such, SCR device could be technically feasible with the addition of a boiler. However, it is important to note that this technology has not been demonstrated in this industry.

LNBs are technically feasible for glass melting furnaces; however, the proposed melter has proposed use of more efficient gas-oxy burners.

SNCR has been eliminated as technically infeasible. The remaining technologies (SCR, gas-oxy firing, LNB, and good combustion techniques) are technically feasible for the proposed furnace.

Ranking of Remaining Control Options (Step 3)

The remaining control technologies are ranked in Table 3-2 in order of highest to lowest control efficiency.

Table 3-2. Technically Feasible Control Technologies – Melter

Pollutant	Control Technologies	Potential Control Efficiency (%)
NOx	Selective Catalytic Reduction Gas-oxy firing Low NO_X burner Good Combustion Techniques	50 - 90% Case-by-case basis Case-by-case basis Case by case basis

Evaluation of Most Stringent Controls (Step 4)

Knauf determined that the top control technology, SCR, is economically infeasible. Application of SCR would first require heating the exhaust gas in stack EP23, which includes the melter and forming/collection emissions, from 140°F to 700°F at a cost of approximately $59,800 per ton of NO_x emissions. It is important to note that this amount does not include the actual direct and operating cost of the selective catalytic reduction. After eliminating SCR, the next highest ranked control technologies that are both technically and economically feasible are gas-oxy firing and good combustion techniques. Use of LNBs is eliminated based on the selection of the higher ranked gas-oxy firing.

Selection of BACT (Step 5)

Knauf has selected gas-oxy firing and good combustion techniques as the best available control technology for the gas oxygen fuel melting furnace. These techniques have been widely used in the fiberglass manufacturing industry as BACT. Knauf is proposing an emission limit of 3.0 lb/ton of glass pulled, which is an estimation of NO_x emissions from stack testing at similar sources. Furthermore, Knauf will demonstrate compliance with this limit by periodic stack testing using EPA Method 7 or 7E.

3.3.2. Forming and Collecting Operations (Group 005)

Identification of Potential Control Techniques (Step 1)

Forming and collecting candidate NO_X control options identified from the RBLC search and the literature review include those classified as pollution reduction techniques - no add-on NO_X controls were identified. NO_X reduction options include:

- Selective Catalytic Reduction (SCR)
- Selective Non-Catalytic Reduction (SNCR)
- Low-NO_X Burner (LNB)

- Good Combustion Techniques
- Natural gas / propane fuel

The majority of these control technologies have been explained in Section 3.3.1 of this report.

Elimination of Technically Infeasible Control Options (Step 2)

As forming and melting share a combined exhaust stack, the technical SNCR infeasibility discussion for the melter also applies to the forming operations. SCR was already demonstrated as economically infeasible for the combined exhaust. Additionally, LNBs have not been demonstrated as BACT for a forming section as proposed for this project. As such, LNBs are not available nor applicable to be considered technically feasible. The only available technology to reduce NO_x will be to have good combustion techniques and use of natural gas as fuel.

Ranking of Remaining Control Options (Step 3)

Since the proposed BACT includes both the technically feasible control technologies, there is no need for a ranking table comparing technologies.

Evaluation of Most Stringent Controls (Step 4)

There is only one feasible control technology. As such, no further analysis has to be completed.

Selection of BACT (Step 5)

Knauf has selected good combustion techniques and use of natural gas as fuel as BACT for the forming and collecting equipment. These techniques have been widely used in similar industries where no add-on control devices are feasible. Knauf is proposing an emission limit of 0.21 lb/ton of glass pulled, which is an estimation of NO_x emissions from stack testing at similar sources. Furthermore, Knauf will demonstrate compliance with this limit by EPA Method 7 or 7E.

3.3.3. Curing and Cooling Operations (Group 007)

Identification of Potential Control Techniques (Step 1)

Curing and cooling candidate control options identified from the RBLC search and the literature review include those classified as pollution reduction techniques. NO_X reduction options include:

- Selective Catalytic Reduction (SCR)
- Selective Non-Catalytic Reduction (SNCR)
- Low-NOX Burner (LNB)
- Good Combustion Techniques

These control technologies have been explained in Section 3.3.1 of this report.

Elimination of Technically Infeasible Control Options (Step 2)

The proposed curing and cooling equipment consist of direct fired units with exhaust gases around 350°F. Similar to the melting furnace, these operating conditions limit the viability to implement certain control technologies. SNCR is technically infeasible since the exhaust temperature for the proposed equipment (350°F) is significantly lower than the required operating temperature of the control devices (1,600-2,400°F) and has not been demonstrated in the industry. Even if the temperature of the exhaust was raised with a large boiler, the emissions of the boiler unit would surpass the NO_x emission savings.

SCR has the same technological challenge with the operating conditions, but with a lower operating temperature (~700°F). As such, SCR could be technically feasible with the addition of a boiler. However, SCR has not been demonstrated as BACT for a curing oven. As such, SCR is not available nor applicable to be considered technically feasible.

The remaining technologies (LNB in the curing oven burners, and good combustion techniques) are technically feasible for the proposed curing and cooling equipment.

Ranking of Remaining Control Options (Step 3)

A ranking of point source control technologies is included in Table 3-3.

Table 3-3. Technically Feasible Control Technologies – Curing and Cooling

Pollutant	Control Technologies	Potential Control Efficiency (%)
NOx	Low NO_X burner Good Combustion Techniques	Case-by-case basis Case by case basis

Evaluation of Most Stringent Controls (Step 4)

The only control technologies that are both technically and economically feasible are LNBs in the curing ovens and good combustion techniques.

Selection of BACT (Step 5)

Knauf has selected good combustion techniques and Low NO_x burners as the best available control technology for the curing and cooling equipment. These techniques have been widely used in similar industries where there are no more stringent control devices. Knauf is proposing an emission limit of 0.59 lb/ton of glass pulled, which is an estimation of NO_x emissions from stack testing at similar sources. Furthermore, Knauf will demonstrate compliance with this limit by EPA's Method 7 or 7E.

3.4. $PM/PM_{10}/PM_{2.5}$ BEST AVAILABLE CONTROL TECHNOLOGY

This BACT discussion consolidates each individual pollutant (PM, PM_{10}, and $PM_{2.5}$) BACT evaluation into a single section as the formation and control technologies for each are similar. Any differences in final BACT determination or specific technical considerations are highlighted. Furthermore, with respect to precursor pollutants, the previous section addresses NO_X BACT for one precursor pollutant. The other potential precursor pollutant is SO_2, which is emitted in significantly lower quantities, such that any controls to reduce condensable PM formation related to SO_2 emissions would not be cost effective.

3.4.1. Raw Material Handling Operations (Group 001) and Facing, Sizing and Packaging (Group 8)

There are multiple proposed material handling sources such as enclosed transfer points, screens, and storage bins and potential fugitive sources such as material transfer points that result in $PM/PM_{10}/PM_{2.5}$ emissions. For the proposed project, particulate emissions are primarily from raw material transfer points. Such a point would be where sand pours from a conveyor belt into a storage silo. Note that raw material handling also includes the three (3) new proposed cullet silos. Additional particulate emissions are generated during facing, sizing and packaging.

Identification of Potential Control Techniques (Step 1)

Candidate control options identified from the RBLC search and the literature review include those classified as pollution reduction techniques. Application of a control technology differs for point sources and fugitive sources. PM reduction options from point sources include:

- Baghouse
- Electrostatic Precipitator
- Wet Scrubbing

These control technologies are briefly discussed in the following sections.

Baghouse

A baghouse consists of several fabric filters, typically configured in long, vertically suspended sock-like configurations. Dirty gas enters from one side, often from the outside of the bag, passing through the filter media and forming a particulate cake. The cake is removed by shaking or pulsing the fabric, which loosens the cake from the filter, allowing it to fall into a bin at the bottom of the baghouse. The air cleaning process stops once the pressure drop across the filter reaches an economically unacceptable level. Typically, the trade-off to frequent cleaning and maintaining lower pressure drops is the wear and tear on the bags produced in the cleaning process. A baghouse can generally achieve approximately 99-99.9% reduction efficiency for PM emissions.

Electrostatic Precipitator (ESP)

An ESP removes particles from an air stream by electrically charging the particles then passing them through a force field that causes them to migrate to an oppositely charged collector plate. After the particles are collected, the plates are knocked ("rapped"), and the accumulated particles fall into a collection hopper at the bottom of the ESP. The collection efficiency of an ESP depends on particle diameter, electrical field strength, gas flow rate, and plate dimensions. An ESP can be designed for either dry or wet applications. An ESP can generally achieve approximately 99-99.9% reduction efficiency for PM emissions.

Wet Scrubbing

Wet scrubbers remove PM by impacting the exhaust gas with the scrubbing solution. This technology generates wastewater and sludge disposal problems along with substantial energy requirements for pumping water and exhausting the cooled air stream out the stack. The control efficiency offered by wet scrubbing is not as high as the baghouse or ESP. A wet scrubber can generally achieve approximately 80-99% reduction efficiency for PM emissions.

Elimination of Technically Infeasible Control Options (Step 2)

All of the above mentioned options are technically feasible for control of PM from the raw material handling and facing, sizing and packaging operations for a fiberglass facility.

Ranking of Remaining Control Options (Step 3)

The control technologies are ranked in Table 3-4 in order of highest to lowest control efficiency.

Table 3-4. Technically Feasible Control Technologies – Group 1 and Group 8

Pollutant	Control Technologies	Potential Control Efficiency (%)
$PM/PM_{10}/PM_{2.5}$	Baghouse & ESP Wet Scrubbing	> 99% 99%

Evaluation of Most Stringent Controls (Step 4)

Knauf determined that the top control technology, a baghouse, is economically feasible. Since Knauf has choosing the top level control, no further economic analysis is necessary. Note that condensable PM are not expected from these operations.

Selection of BACT (Step 5)

Since baghouses offer the highest control of PM emissions and are widely accepted as BACT for control of PM emissions from point sources, Knauf has determined that the baghouses are BACT for proposed material handling equipment. Knauf is proposing a $PM_{10}/PM_{2.5}$ limit of 0.07 lb/hr and a PM emission limit of 0.15 lb/hr for raw material handling and $PM_{10}/PM_{2.5}$ limit of 0.01 lb/hr and a PM emission limit of 0.02 lb/hr for the new day bin vents. These emissions are based on EPA AP-42 emissions factors. Compliance will be demonstrated based on manufacturer guarantees. Note that these emissions are ultimately routed to EP23 (forming stack).

Knauf has also determined that the baghouse is BACT for proposed sizing and packaging area. Knauf is proposing a $PM/PM_{10}/PM_{2.5}$ limit of 0.64 lb/hr for the baghouse and 0.15 lb/hr emission limit for $PM/PM_{10}/PM_{2.5}$ from the facing application. Compliance will be demonstrated based on manufacturer guarantees for the individual pieces of equipment. Note that these emissions are ultimately routed to EP23 (forming stack).

3.4.2. Melt and Refining Operations (Group 003)

Background and Pollutant Formation

$PM/PM_{10}/PM_{2.5}$ emissions are generated from raw materials particles entrained in the furnace flue gas, and from the combustion product due to the natural gas fueled furnace. The furnace is a point source of particulate emissions

Identification of Potential Control Techniques (Step 1)

Candidate control options identified from the RBLC search and the literature review include those classified as pollution reduction techniques. Application of a control technology differs for point sources and fugitive sources. PM reduction options from point sources include:

- Baghouse
- Electrostatic Precipitator (ESP)
- Wet Scrubbing

The point source PM control technologies are briefly discussed in Sections 3.4.1.

Elimination of Technically Infeasible Control Options (Step 2)

All of the above mentioned options are technically feasible for control of PM from the gas-oxy melter furnace and the refiner.

Ranking of Remaining Control Options (Step 3)

A ranking of point source control technologies is included in Table 3-4.

Evaluation of Most Stringent Controls (Step 4)

Knauf determined that the top control technology, a baghouse, is economically feasible. Since Knauf has choosing the top level control, no further economic analysis is necessary. A baghouse will be installed at the exhaust stream of the melter furnace to control PM emissions. Although wet scrubbing may also control condensable PM to a small degree, the majority of uncontrolled emissions from the melter are filterable in nature, such that selecting a less efficient filterable control device to reduce condensable PM emissions would result in an overall increase in emissions.

Selection of BACT (Step 5)

Since baghouses offer the highest control of PM emissions and are widely accepted as BACT for control of PM emissions from point sources, Knauf has determined that the baghouses are BACT for proposed melt and refining operation. Knauf is proposing a PM filterable limit of 1.67 lb.hr and a $PM_{10}/PM_{2.5}$ (filterable and condensable) emission limit of 1.67 lb/hr. Compliance will be demonstrated based initial performance testing per Method 5 for filterable PM and Methods 201or 201A and Method 202 for $PM_{10}/PM_{2.5}$ (filterable and condensable).

3.4.3. Forming and Collecting Operations (Group 005)

Background and Pollutant Formation

Particulate matter emissions generated during the manufacture of wool fiberglass insulation include solid particles of glass and binder resin, droplets of binder, and components of the binder that have vaporized.

Identification of Potential Control Techniques (Step 1)

Candidate control options identified from the RBLC search and the literature review include those classified as pollution reduction techniques. Application of a control technology differs for point sources and fugitive sources. PM reduction options from point sources include:

- Baghouse
- Electrostatic Precipitator (ESP)
- Wet Scrubbing and Design. For this equipment, the project design includes the use of a fiber collection chamber with wet collection (base case)

All the aforementioned sources have been explained in detail in Sections 3.4.1.

Elimination of Technically Infeasible Control Options (Step 2)

The forming and collecting exhaust stream contains a significant amount of moisture and fiberglass particles that could potentially block the filters for the baghouse, making the control device useless. As such, this type of technology is infeasible for the proposed equipment/process and has not been demonstrated in the industry. The remaining technologies are all feasible to control PM emissions.

Ranking of Remaining Control Options (Step 3)

The remaining control technologies are ranked in Table 3-5 in order of highest to lowest control efficiency. Note that the control efficiencies noted are for both condensable and filterable PM combined and are based on engineering testing performed by Knauf at other facilities.

Table 3-5. Technically Feasible Control Technologies – Forming and Collecting

Pollutant	Control Technologies	Potential Control Efficiency (%)
PM/PM_{10}/$PM_{2.5}$	ESP Design + Wet Collection	50% (beyond base) Base

Evaluation of Most Stringent Controls (Step 4)

Knauf determined that the top control technology, an ESP, is economically infeasible since the total capital and operating cost of the equipment would be equivalent to approximately $16,000 per each ton of PM emissions. A detail cost analysis is under attachment N. Since the top technology is not economically feasible, Knauf has chosen the base case (design and wet collection) as BACT.

Selection of BACT (Step 5)

Knauf selected design and wet collection as the best available control technology. Knauf is proposing a PM_{10}/$PM_{2.5}$ (filterable and condensable) emission limit of 21.40 lb/hr and a PM (filterable) limit of 17.12 lb/hr. Compliance will be demonstrated based on manufacturer guarantees for the individual pieces of equipment and initial performance testing per Method 5 for filterable PM and Method 5E for PM_{10}/$PM_{2.5}$ (filterable and condensable).

3.4.4. Curing and Cooling Operations (Group 007)

Particulate matter emissions generated during the manufacture of wool fiberglass curing, or cooling operations include glass particles entrained in the exhaust gas stream.

Identification of Potential Control Techniques (Step 1)

Candidate control options identified from the RBLC search and the literature review include those classified as pollution reduction techniques. Application of a control technology differs for point sources and fugitive sources. PM reduction options from point sources include:

- Baghouse
- Electrostatic Precipitator (ESP)
- Wet Scrubbing

The point source PM control technologies are briefly discussed in Sections 3.4.1.

Elimination of Technically Infeasible Control Options (Step 2)

Based on the same premise as the forming and collecting operations, a baghouse would be technically infeasible as a control device since there are still fiberglass particles and moisture in the exhaust stream that could potentially block the filter and damage the device. Furthermore, this type of technology has not been demonstrated in similar industries/processes with fiberglass. The remaining control technologies are technically feasible.

Ranking of Remaining Control Options (Step 3)

A ranking of point source control technologies is included in Table 3-5.

Evaluation of Most Stringent Controls (Step 4)

Knauf determined that the top control technology, an ESP, is economically infeasible since the total capital and operating cost of the equipment would result in cost effectiveness that exceeds the $16,000 per each ton of PM

emissions outlined in Section 3.4.3 (relatively same capital costs and less pollutant removed). Since the top technology is not economically feasible, Knauf has chosen the base case (wet scrubbing) as the BACT.

Selection of BACT (Step 5)

Knauf selected the wet scrubbing and existing design parameters as the best available control technology. Knauf is proposing a $PM_{10}/PM_{2.5}$ (filterable and condensable) emission limit of 7.33 lb/hr and a PM (filterable) limit of 5.87 lb/hr. Compliance will be demonstrated based on manufacturer guarantees for the individual pieces of equipment and Method 5/5E.

3.4.5. Cooling Tower

The proposed new cooling towers (towers 3, 4, and 5) are mechanical induced draft cooling towers. Particulate matter is emitted from wet cooling towers because the water circulating in the tower contains small amounts of dissolved solids (e.g., calcium, magnesium, etc.) that crystallize and form airborne particles as the water drift leaves the cooling tower and evaporates.

Identification of Potential Control Techniques (Step 1)

Candidate control options identified from the RBLC search and the literature review include those classified as pollution reduction techniques. PM and $PM_{10}/PM_{2.5}$ reduction options for cooling towers include:

- Drift/Mist Eliminator
- Minimize Total Dissolved Solids by Good Operating Practices

Drift Eliminator

Drift eliminators control the undesired loss of liquid water to the environment via small droplets that become entrained in the leaving air stream. These water droplets, known as drift, carry with them particles that are emitted to the surrounding environment. Drift eliminators are designed to capture large water droplets caught in the cooling tower air stream. The eliminators prevent the water droplets and mist from escaping the cooling tower. Eliminators do this by causing the droplets to change the direction and lose velocity at impact on the blade walls and fall back into the tower.

Minimize Total Dissolved Solids by Good Operating Practices

Minimizing total dissolved solids consist of improving the cooling water system techniques by good engineering practices, such as maintaining clean water in the pipes and reducing contact with the surrounding environment. This is considered the base case for preventing the solid emissions.

Elimination of Technically Infeasible Control Options (Step 2)

Drift eliminators and minimizing total dissolved solids in the water are technically feasible and commonly employed for wet cooling towers.

Ranking of Remaining Control Options (Step 3)

The control technologies are ranked in Table 3-6 in order of highest to lowest control efficiency.

Table 3-6. Technically Feasible Control Technologies – Cooling Tower

Pollutant	Control Technologies	Potential Control Efficiency (%)
$PM/PM_{10}/PM_{2.5}$	Drift Eliminator Minimized Dissolved Solids	> 99% Case by case

Evaluation of Most Stringent Controls (Step 4)

Knauf determined that the top control technology, a drift eliminator, is economically feasible. Since Knauf has choosing the top level control, no further economic analysis is necessary. A drift eliminator will be installed at each cooling tower on site.

Selection of BACT (Step 5)

Proposed BACT is the installation of drift eliminators for the proposed cooling towers. Drift eliminators reduce drift formation which in turn reduces all size fractions of PM emissions. U.S. EPA has not promulgated an approved test method for measuring PM emissions in cooling tower drift. Knauf proposes compliance with the BACT be installation and operation of the cooling towers and drift eliminators in accordance with the manufacturer's emissions related instructions.

Knauf is proposing to utilize drift eliminators for the proposed mechanical cooling towers to achieve compliance with a BACT limit of 0.005 percent drift rate. This drift rate is within the range of with other recent BACT determinations for equipment of this size.

3.5. EMERGENCY GENERATOR BEST AVAILABLE CONTROL TECHNOLOGY

The proposed engine is diesel fired and conforms to all requirements of NSPS Subpart IIII. Due to the limited operation, emissions from the proposed engine, are less than 5 tpy of each criteria pollutant. EPA determined in the development of NSPS Subpart IIII that add-on controls are economically infeasible for emergency-use internal combustion engines (ICE).

> *"The EPA also evaluated the BDT for emergency stationary CI ICE… The use of add-on controls such as CDPF, oxidation catalyst, and NOX adsorber could not be justified as BDT due to the cost of the technology relative to the emission reduction that would be obtained. This is discussed in more detail later in this preamble and in the documents supporting the proposal. The EPA, therefore, determined that the engine technologies developed by engine manufacturers to meet the Tier 2 and Tier 3 nonroad diesel engine standards, and those Tier 4 standards that do not require aftertreatment, are the BDT for 2007 model year and later emergency stationary CI ICE with a displacement of less than 10 liters per cylinder."*

Based on EPA's economic analysis, Knauf has determined that add-on controls are not BACT for NO_X, PM, $PM_{2.5}$ or PM_{10}. EPA's cost information is found in the supporting documents for the proposed NSPS. Since the units will be operated during periods of power interruption, diesel fuel is the only technically feasible option due to the interruptible nature of natural gas supply.

To comply with the proposed BACT limits, Knauf will purchase an ICE certified by the manufacturer to meet NSPS Subpart IIII emission levels and will use fuel complying with NSPS Subpart IIII requirements. Operation of the ICE for the purposes of maintenance checks and readiness testing (per recommendations from the government, manufacturer/vendor, or insurance) will be limited to 100 hours per year. Knauf will also monitor diesel fuel usage.

4. R14 APPLICATION FORMS

The WVDEP permit application forms contained in this application include all applicable R14 application forms including the required attachments.

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.dep.wv.gov/daq

APPLICATION FOR NSR PERMIT AND TITLE V PERMIT REVISION (OPTIONAL)

PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN):

☐ **CONSTRUCTION** ☒ **MODIFICATION** ☐ **RELOCATION**
☐ **CLASS I ADMINISTRATIVE UPDATE** ☐ **TEMPORARY**
☐ **CLASS II ADMINISTRATIVE UPDATE** ☐ **AFTER-THE-FACT**

PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY):

☐ **ADMINISTRATIVE AMENDMENT** ☐ **MINOR MODIFICATION**
☒ **SIGNIFICANT MODIFICATION**

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS **ATTACHMENT S** TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant *(as registered with the WV Secretary of State's Office):*
Knauf Insulation, LLC

2. Federal Employer ID No. ***(FEIN):***
35-1417383

3. Name of facility *(if different from above):*
Inwood Facility

4. The applicant is the:
☐ **OWNER** ☐ **OPERATOR** ☒ **BOTH**

5A. Applicant's mailing address:
4812 Tabler Station Road
Inwood, WV 25428

5B. Facility's present physical address:
4812 Tabler Station Road
Inwood, WV 25428

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☒ **YES** ☐ **NO**

- If **YES,** provide a copy of the **Certificate of Incorporation/Organization/Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A.**
- If **NO,** provide a copy of the **Certificate of Authority/Authority of L.L.C./Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A.**

7. If applicant is a subsidiary corporation, please provide the name of parent corporation: NA

8. Does the applicant own, lease, have an option to buy or otherwise have control of the *proposed site?* ☒ **YES** ☐ **NO**

- If **YES,** please explain: Owned

- If **NO,** you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.): Wool fiberglass manufacturing facility

10. North American Industry Classification System **(NAICS)** code for the facility:
327993

11A. DAQ Plant ID No. (for existing facilities only):
0 0 3 – 0 0 0 1 2

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):
R30-00300012-2013; R14-0015L

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

12A.

- For **Modifications, Administrative Updates** or **Temporary permits** at an existing facility, please provide directions to the *present location* of the facility from the nearest state road;
- For **Construction** or **Relocation permits,** please provide directions to the *proposed new site location* from the nearest state road. Include a **MAP** as **Attachment B**.

¼ mile east of Tabler Station Road off I-81.

12.B. New site address (if applicable):	12C. Nearest city or town:	12D. County:
NA	Inwood	Berkeley
12.E. UTM Northing (KM): 4,365.50	12F. UTM Easting (KM): 756.55	12G. UTM Zone: 17

13. Briefly describe the proposed change(s) at the facility:

Knauf is proposing to upgrade the second fiberglass insulation production line (Line 2). The upgrades to Line 2 include, but are not limited to, installation of a new gas oxygen-fueled (gas-oxy) melting furnace, upgraded canal/channel and forehearth, fiber forming equipment, and packaging equipment. The project also involves modification of the existing curing oven and glass raw material handling and storage facilities.

14A. Provide the date of anticipated installation or change: As soon as possible – If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: / /	14B. Date of anticipated Start-Up if a permit is granted: September 2017

14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:

Hours Per Day 24 Days Per Week 7 Weeks Per Year 52

16. Is demolition or physical renovation at an existing facility involved? ☒ **YES** ☐ **NO**

17**. Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18**. Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process *(if known).* A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance *(if known).* Provide this information as **Attachment D.**

Section II. Additional attachments and supporting documents.

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate **application fee** (per 45CSR22 and 45CSR13).

20. Include a **Table of Contents** as the first page of your application package.

21. Provide a **Plot Plan,** e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to ***Plot Plan Guidance***) **.**

– Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F.**

23. Provide a **Process Description** as **Attachment G.**

– Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H.**

– For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I.**

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J.**

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K.**

28. Check all applicable **Emissions Unit Data Sheets** listed below:

☐ Bulk Liquid Transfer Operations	☒ Haul Road Emissions	☐ Quarry
☐ Chemical Processes	☐ Hot Mix Asphalt Plant	☐ Solid Materials Sizing, Handling and Storage Facilities
☐ Concrete Batch Plant	☐ Incinerator	☐ Storage Tanks
☐ Grey Iron and Steel Foundry	☐ Indirect Heat Exchanger	

☒ General Emission Unit, specify Melting Furnace, Forming and Collection, Curing and Cooling, Facing/Sizing/Packaging, New Emergency Generator

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L.**

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

☐ Absorption Systems	☒ Baghouse	☐ Flare
☐ Adsorption Systems	☐ Condenser	☐ Mechanical Collector
☒ Afterburner	☐ Electrostatic Precipitator	☒ Wet Collecting System

☐ Other Collectors, specify

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M.**

30. Provide all **Supporting Emissions Calculations** as **Attachment N,** or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O.**

➢ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and ***Example Legal Advertisement*** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33**. Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

☐ **YES** ☒ **NO**

➢ If **YES,** identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's *"**Precautionary Notice – Claims of Confidentiality"*** guidance found in the ***General Instructions*** as **Attachment Q.**

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below:

☐ Authority of Corporation or Other Business Entity	☐ Authority of Partnership
☐ Authority of Governmental Agency	☐ Authority of Limited Partnership

Submit completed and signed **Authority Form** as **Attachment R.**

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned ☒ **Responsible Official** / ☐ **Authorized Representative,** hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE _____ DATE: _____

(Please use blue ink) *(Please use blue ink)*

35B. Printed name of signee: Iain James		35C. Title: VP Manufacturing
35D. E-mail: Iain.james@knaufinsulation.com	36E. Phone: 317-421-8758	36F. FAX: N/A
36A. Printed name of contact person (if different from above): Chris Mahin		36B. Title: Regional HSE Manager
36C. E-mail: chris.mahin@knaufinsulation.com	36D. Phone: 317-421-8561	36E. FAX:

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

☒ **Attachment A: Business Certificate**
☒ **Attachment B: Map(s)**
☒ **Attachment C: Installation and Start Up Schedule**
☒ **Attachment D: Regulatory Discussion**
☒ **Attachment E: Plot Plan**
☒ **Attachment F: Detailed Process Flow Diagram(s)**
☒ **Attachment G: Process Description**
☐ **Attachment H: Material Safety Data Sheets (MSDS)**
☒ **Attachment I: Emission Units Table**
☒ **Attachment J: Emission Points Data Summary Sheet**
☒ **Attachment K: Fugitive Emissions Data Summary Sheet**
☒ **Attachment L: Emissions Unit Data Sheet(s)**
☒ **Attachment M: Air Pollution Control Device Sheet(s)**
☒ **Attachment N: Supporting Emissions Calculations**
☒ **Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans**
☒ **Attachment P: Public Notice**
☐ **Attachment Q: Business Confidential Claims**
☐ **Attachment R: Authority Forms**
☒ **Attachment S: Title V Permit Revision Information**
☒ **Application Fee**

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

☐ ***Forward 1 copy of the application to the Title V Permitting Group and:***
☐ ***For Title V Administrative Amendments:***
  ☐ ***NSR permit writer should notify Title V permit writer of draft permit,***
☐ ***For Title V Minor Modifications:***
  ☐ ***Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,***
  ☐ ***NSR permit writer should notify Title V permit writer of draft permit.***
☐ ***For Title V Significant Modifications processed in parallel with NSR Permit revision:***
  ☐ ***NSR permit writer should notify a Title V permit writer of draft permit,***
  ☐ ***Public notice should reference both 45CSR13 and Title V permits,***
  ☐ ***EPA has 45 day review period of a draft permit.***

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

ATTACHMENT A

Current Business Certificate

WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION CERTIFICATE

ISSUED TO:
KNAUF INSULATION, LLC
DBA GUARDIAN LAMINATION SERVICES
4812 TABLER STATION RD
INWOOD, WV 25428-4599

BUSINESS REGISTRATION ACCOUNT NUMBER: **1028-9013**

This certificate is issued on: 09/16/2014

This certificate is issued by
the West Virginia State Tax Commissioner
in accordance with Chapter 11, Article 12, of the West Virginia Code

The person or organization identified on this certificate is registered to conduct business in the State of West Virginia at the location above.

This certificate is not transferrable and must be displayed at the location for which issued

This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them. CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of this certificate displayed at every job site within West Virginia.

atL006 v.4
L1916500544

ATTACHMENT B

Map

ATTACHMENT B

Figure 1 – Aerial Image of Knauf Inwood Facility

Facility Coordinates:

Latitude: 39°24’09.30’’ N
Longitude: 78°01’22.39’’ W

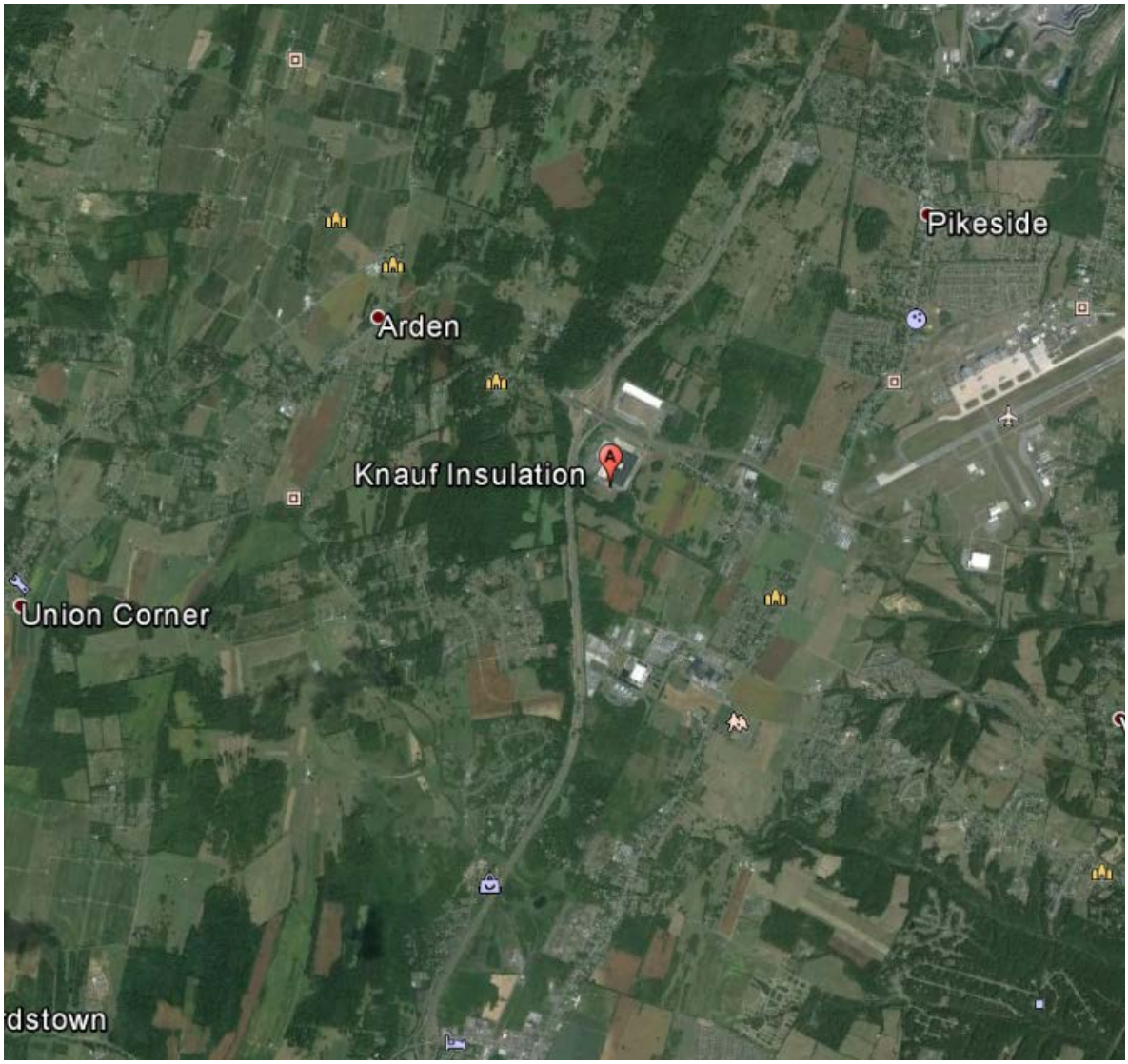

Figure 2 – Extended Aerial Image of Knauf Inwood Facility

ATTACHMENT C

Startup and Installation Schedule

ATTACHMENT C

Schedule of Planned Installation and Start-Up

Unit	Installation Schedule	Startup Schedule
ES22: New Melter and Forehearth upgrades	2017	2017
ES23: Forming and Collection modifications	2017	2017
ES24: Increase curing and cooling capacity	2017	2017
ES11a,b: New Day Bins, other Raw Material Handling modifications, and ES25: Facing/Sizing/Packaging modifications	2017	2017
New Cooling Towers	2017	2017
New Caterpillar C18 900 HP Emergency Generator	2017	2017

ATTACHMENT D

Regulatory Discussion

ATTACHMENT D – REGULATORY APPLICABILITY

This section documents the applicability determinations made for Federal and State air quality regulations. The monitoring, recordkeeping, reporting, and testing plan is presented in Attachment O. In this section, applicability or non-applicability of the following regulatory programs is addressed:

- Prevention of Significant Deterioration (PSD) permitting;
- Title V of the 1990 Clean Air Act Amendments;
- New Source Performance Standards (NSPS);
- National Emission Standards for Hazardous Air Pollutants (NESHAP); and
- West Virginia State Implementation Plan (SIP) regulations.

This review is presented to supplement and/or add clarification to the information provided in the WVDEP R14 permit application forms. In addition to providing a summary of applicable requirements, this section of the application also provides non-applicability determinations for certain regulations, allowing the WVDEP to confirm that identified regulations are not applicable to the Inwood facility. Note that explanations of non-applicability are limited to those regulations for which there may be some question of applicability specific to the operations at the Inwood facility. Regulations that are categorically non-applicable are not discussed (e.g., NSPS Subpart J, Standards of Performance for Petroleum Refineries).

Prevention of Significant Deterioration (PSD) Source Classification

Federal construction permitting programs regulate new and modified sources of attainment pollutants under PSD and new and modified sources of non-attainment pollutants under Non-Attainment New Source Review (NNSR). Berkeley County is designated as attainment for all criteria pollutants. PSD and NNSR regulations apply when a major source makes a change, such as installing new equipment or modifying existing equipment, and a significant increase in emissions results from the change. The Inwood facility is a major source with respect to these programs since its potential emissions are above PSD major source thresholds.

Section 2 of this application explains the methodology to calculate net emission increase for each pollutant, with supporting calculations under Attachment N. Emission increases for the proposed project are above the applicable NSR major threshold for NO_X, PM, PM_{10}, and $PM_{2.5}$. As such, PSD permitting is triggered by the proposed project. West Virginia regulations under §45-14 describes the permits for construction and major modification of major stationary sources for the Prevention of Significant Deterioration of Air Quality. The applicable requirements for the site to be in compliance with PSD regulations are summarized below:

§45-14-7. Registration, Reporting and Permit Requirements for Major Stationary Sources and Major Modifications: Knauf, with this R14 application, is filling with the Secretary a timely and complete permit application containing sufficient information, which should enable the Secretary to determine whether the upgrades in Line 2 will be in conformance with the previsions of any rules promulgated by the Secretary in general and with the requirements of this rule section.

§45-14-8. Control Technology Requirements: Knauf will apply best available control technology for each regulated NSR pollutant that it would have the potential to emit in significant amounts. Section 3 of the report explains in detail how Knauf will apply these technologies.

§45-14-9. Requirements Relating to the Source's Impact on Air Quality: Knauf will demonstrate that allowable emissions increases from the proposed Line 2 modification would not cause or contribute to air pollution in violation National

Ambient Air Quality Standard or any maximum allowable increase over the baseline concentration in any area. Knauf will address these requirements as part of the modeling report, to be submitted under separate cover.

§45-14-11. Air Quality Monitoring Requirements: Knauf will provide an analysis of the ambient air quality in the area where the Inwood facility sources would affect for each pollutant that exceed the PSD major threshold and address these requirements as part of the modeling report, to be submitted under separate cover.

§45-14-12. Additional Impact Analysis Requirements: Knauf will provide an analysis of the impairment to visibility, soils, and vegetation that would occur as a result of the modification and growth associated with the sources modifications. Furthermore, Knauf will also provide an analysis of the air quality impact projected for the area as a result of general growth associated with the modification. Knauf will address these requirements as part of the modeling report, to be submitted under separate cover.

Title V Operating Permit Program

Title 40 of the Code of Federal Regulations Part 70 (40 CFR 70) establishes the federal Title V operating permit program. West Virginia has incorporated the provisions of this federal program in its Title V operating permit program in West Virginia Code of State Regulations (CSR) 45-30. The major source thresholds with respect to the West Virginia Title V operating permit program regulations are 10 tons per year (tpy) of a single HAP, 25 tpy of any combination of HAP, and 100 tpy of all other regulated pollutants. The Inwood facility is currently a major source with respect to the Title V permit program. Knauf will revise the Title V permit within 12 months of commencing operation after the proposed modifications.

New Source Performance Standards

NSPS, located in 40 CFR 60, require new, modified, or reconstructed sources to control emissions to the level achievable by the best demonstrated technology as specified in the applicable provisions. Moreover, any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, except where expressly noted. The following is a summary of applicability and non-applicability determinations for NSPS regulations of relevance to the proposed project at the Inwood facility.

NSPS Subpart CC — Standards of Performance for Glass Manufacturing Plants

New Source Performance Standards 40 CFR Part 60 Subpart CC (NSPS CC) affects owners and operators of glass melting furnaces that commence construction or modification after June 15, 1979. Knauf is planning to install a new gas oxygen-fueled (gas-oxy) glass melting furnace on Line 2 at the Inwood facility. As such, the proposed melting furnace is subject to this subpart (note that the forming apparatuses in the forehearth are not considered part of the melting furnace). The emission limits for gaseous fired glass melting furnaces is 0.25 g/ kg glass produced (as determined by Method 5). Knauf will demonstrate compliance with the requirements specified under 40 CFR §60.292 (standards of particular matter) and §60.296 (testing methods) for the proposed melting furnace at the facility, which included an initial performance test with 180 days after initial start up to demonstrate compliance with the regulation. The proposed BACT limit complies with this the emission limits in NSPS CC.

NSPS Subpart PPP — Standards of Performance for Wool Fiberglass Insulation Manufacturing Plants

New Source Performance Standards 40 CFR Part 60 Subpart PPP (NSPS PPP) affects owners and operators of rotary spin wool fiberglass insulation manufacturing line that commence construction, modification or reconstruction after February 7, 1984. The regulation limits affected facilities to discharge any gas which contain particular matter in excess of 11 lb/ton of gas pulled. Furthermore, if a wet scrubber control device is used to comply with the emission standard, the owner or operator shall calibrate, maintain, and operate monitoring devices which measure the pressure drop across each scrubber and the scrubbing liquid flow rate to each scrubber. Line 2 at the Inwood facility is currently subject to the requirements of this subpart, and will continue to comply with the conditions, as incorporated into the Title V permit, after the completion of the proposed project. Knauf will demonstrate compliance

with the regulations by conducting an initial performance test, as required by §60.8. The proposed BACT limits comply with the emission limits in NSPS PPP.

NSPS Subpart IIII — Standards of Performance for Compression Ignition Internal Combustion Engines

40 CFR Part 60 Subpart IIII (NSPS IIII) affects owners and operators of stationary compression ignition internal combustion engines (CI ICE) that commence construction, reconstruction or modification after June 11, 2005, and manufactured after April 1, 2005. Applicability dates are based on the date the engine was ordered by the operator.

The proposed Caterpillar C18 emergency generator engine to be installed at the Inwood facility will be subject to Subpart IIII based on its order and manufacture dates. As such the following requirements pertain to the proposed new emergency generator engine.

- The engine must be certified to meet the applicable, Tier 2 requirements contained in 40 CFR 89.112 per 40 CFR 60.4202. Note that the emission calculations in the application are based on worst-case estimates on load testing. The engine is certified to meet Tier 2 limits.

Tier 2 Limitations (Engines > 560 kW)

NMHC+NO_X g/kW-hr *(g/HP-hr)*	**CO** g/kW-hr *(g/HP-hr)*	**PM** g/kW-hr *(g/HP-hr)*	**Opacity**
6.4 *(4.77)*	3.5 *(2.61)*	0.20 *(0.15)*	20% during acceleration mode, 15% during the lugging mode, and 50% during the peaks in either the acceleration or lugging modes

- Knauf will meet the fuel sulfur requirements contained in 40 CFR 60.4207 (15 ppm sulfur content and either a minimum cetane index of 40 or a maximum aromatic content of 35% by volume).
- Knauf will operate and maintain the engine according to the manufacturer's emission-related written instructions and change only those emission-related settings that are permitted by the manufacturer.
- The engine must be installed and configured according to the manufacturer's emission-related specifications, except as permitted in 40 CFR 60.4211(g).[1]
- As an emergency stationary ICE, the engine is limited to 100 hours per year for maintenance and testing of which the engine may be operated for up to 50 hours in non-emergency situations.
- As an emergency stationary ICE, the engine may be operated for periods where there is a deviation of voltage or frequency of 5 percent or greater below standard voltage or frequency.
- Knauf will keep records of the operation of the engine that are recorded through the non-resettable hour meter. The time of operation of the engine and the reason the engine was in operation will be recorded

Non-Applicability of All Other NSPS

NSPS are developed for particular industrial source categories. Other than NSPS developed for wool fiberglass manufacturing plants (Subpart PPP) and associated equipment (Subpart CC), the applicability of a particular NSPS to the Inwood facility can be readily ascertained based on the industrial source category covered. All other NSPS are categorically not applicable to wool fiberglass manufacturing plants.

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[1] Engines not installed, configured, operated, and maintained according to the manufacturer's emission-related written instructions are required to keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, initial and periodic performance tests are required.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

Part 63 NESHAP allowable emission limits are established on the basis of a maximum achievable control technology (MACT) determination for a particular major source. A HAP major source is defined as having potential emissions in excess of 25 tpy for total HAP and/or potential emissions in excess of 10 tpy for any individual HAP. The Inwood facility is an Area (minor) source of HAP since its potential emissions of HAP are less than the 10/25 major source thresholds. The potentially applicable NESHAP to the proposed project at the facility are Subparts NN, NNN, and ZZZZ, which are discussed below.

40 CFR 63 Subpart NN – National Emission Standards for Hazardous Air Pollutants for Wool Fiberglass Manufacturing at Area Source

Subpart NN applies to each wool fiberglass manufacturing facility that is an area source. The requirements apply to each new and existing gas-fired melting furnace, where a gas-fired glass melting furnace is defined as:

> *"a unit comprising a refractory vessel in which raw materials are charged, melted at high temperature using natural gas and other fuels, refined, and conditioned to produce molten glass. The unit includes foundations, superstructure and retaining walls, raw material charger systems, heat exchangers, exhaust system, refractory brick work, fuel supply and electrical boosting equipment, integral control systems and instrumentation, and appendages for conditioning and distributing molten glass to forming processes. The forming apparatus, including flow channels, is not considered part of the gas-fired glass-melting furnace. Cold-top electric furnaces as defined in this subpart are not gas-fired glass-melting furnaces."*

The proposed furnace is still undergoing final design specification. If the unit is constructed such that it meets the definition of a gas-fired glass melting furnace, then it will be subject to the requirements of Subpart NN. Otherwise, the unit will not be subject to this regulation.

If subject, the emission limit from new, existing, or reconstructed melting furnaces is 0.25 lb chromium per thousand tons of glass pulled. The operating limits are summarized in 40 CFR 63.882(b). At this time, Knauf is proposing to install a bag leak detection system to comply with the requirements of the rule if subject. New sources are required to conduct an initial performance test within 180 days of startup. The monitoring requirements are included in Subpart NNN (40 CFR 63.1383) and include developing an operations, maintenance, and monitoring plan. Specific startup and shutdown elements are addressed in Subpart NNN (40 CFR 63.1389).

40 CFR 63 Subpart NNN – National Emission Standards for Hazardous Air Pollutants for Wool Fiberglass Manufacturing

Pursuant to 40 CFR 63.1381, 40 CFR 63 Subpart NNN regulates HAP emissions from various emission units at new and existing major source wool fiberglass manufacturing facilities, including: glass melting furnaces, rotary spin wool fiberglass manufacturing lines producing a bonded wool fiberglass insulation product using a phenol/formaldehyde binder. Pursuant to 40 CFR 63.2, a "major source" is any source which emits or has the potential to emit 10 tpy or more of any HAP, or 25 tpy or more of any combination of HAPs. The Inwood facility is a minor source with respect to HAP. Therefore, the requirements of 40 CFR 63, Subpart NNN will not apply.

40 CFR 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Engines

This rule affects reciprocating internal combustion engines (RICE) located at a major and area sources of HAP. 40 CFR §63.6590(c) states that a new or reconstructed stationary RICE located at an area HAP source must meet the requirements of NESHAP Subpart ZZZZ by meeting the requirements of NSPS Subpart IIII. No further requirements apply for such engines under NESHAP Subpart ZZZZ. The Inwood facility is a minor (area) source of hazardous air pollutants and the emergency generator engine is considered a new stationary RICE. Therefore, the requirements

contained in §63.6590(c) are applicable. Knauf will be in compliance with applicable requirements of 40 CFR 63 Subpart ZZZZ by meeting the applicable requirements of 40 CFR 60 Subpart IIII.

West Virginia SIP Regulations

Knauf's Inwood facility is currently permitted under the regulations contained in West Virginia's Title 45 Legislative Rule Department of Environmental Protection Office of Air Quality (WVDEP regulations). The Code of State Regulations fall under two main categories, those regulations that are generally applicable (e.g., permitting requirements), and those that have specific applicability (e.g., PM standards for manufacturing equipment). This section of the report highlights applicability of specific West Virginia State Implementation Plan (SIP) regulations that may apply to proposed project at the Inwood facility

45 CSR 4: To Prevent and Control the Discharge of Air Pollutants into the Air Which Causes or Contributes to an Objectionable Odor

According to 45 CSR 4-3:

No person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public.

The Inwood facility is generally subject to this requirement. In accordance with the Title V permit, Knauf maintains appropriate records and takes appropriate response measures of all odor complaints.

45 CSR 7: To Prevent and Control Particulate Matter Air Pollution from Manufacturing Processing and Associated Operations

The Inwood facility process operations are generally subject to this requirement, which includes process weight rate and opacity requirements.

The opacity requirement limit opacity to twenty (20) percent, with the exception that a process shall not exceed forty (40) percent opacity for no more than five (5) minutes in any sixty (60) minute period. Knauf is proposing to maintain the existing emission limitations for processes in the current permit.

The proposed filterable PM limits in the application are less (approximately 87% of current limits on a lb/ton basis) than those established to demonstrate compliance with this rule. Therefore, Knauf will continue to comply with the emission limits in this regulation for the process.

45 CSR 14: Permits for Construction and Major Modification of Major Stationary Sources for the Prevention of Significant Deterioration of Air Quality

Knauf provided a summary of the PSD requirements in the preceding sections.

45 CSR 16: Standards of Performance for New Stationary Sources

45 CSR 16-1 incorporates the federal Clean Air Act (CAA) standards of performance for new stationary sources set forth in 40 CPR Part 60 by reference. As such, by complying with all applicable requirements of 40 CFR Part 60 at the Inwood facility, Knauf will be complying with 45 CSR 16.

45 CSR 17: To Prevent and Control Particulate Matter Air Pollution from Materials Handling, Preparation, Storage and Other Sources of Fugitive Particulate Matter

According to 45 CSR 17-3.1:

No person shall cause, suffer, allow or permit fugitive particulate matter to be discharged beyond the boundary lines of the property lines of the property on which the discharge originates or at any public or residential location, which causes or contributes to statutory air pollution.

Due to the nature of the activities at the Inwood facility it is unlikely that fugitive particulate matter emissions will be emitted under normal operating conditions. However, Knauf will take measures to ensure any fugitive particulate matter emissions will not cross the property boundary should any such emissions occur.

45 CSR 27: To Prevent and Control the Emissions of Toxic Air Pollutants

Due to the conversion to ECOSE Technology binder, the Inwood facility will no longer be using phenol formaldehyde resin. As such, the requirements related to these provisions are no longer applicable.

ATTACHMENT E

Plot Plan

KNAUF INSULATION LLC.

INWOOD FACILITY

TITLE V MAP

756557mE, 4365508mN

ELEVATION 586.5 ft

GROUP	AREA	ID. NO.	NAME	EMISSION POINTS
001	A		RAW MATERIAL HANDLING	FP11
002	B		MELTING & REFINING LINE 1	EP12
	B1	ES12C	MELTER	
	B2	ES12E	FOREHEARTH	
003	C		MELTING & REFINING LINE 2	EP22
	C1	ES22C	MELTER	
	C2	ES22E	FOREHEARTH	
004	D		FORMING & COLLECTION LINE 1	EP13
	D1	ES13A	FIBERIZERS	
005	E		FORMING & COLLECTION LINE 2	EP23
	E1	ES23A	FIBERIZERS	
006	F		CURING & COOLING LINE 1	EP14
	F1	ES14A	OVEN	
	F2	ES14B	COOLING TABLE	
007	G		CURING & COOLING LINE 2	EP24
	G1	ES24A	OVEN	
	G2	ES24B	COOLING TABLE	
008	H		FACING, SIZING & PACKAGING LINE 1	FP15
	J		FACING, SIZING & PACKAGING LINE 2	FP15
009	K		SUPPORT FACILITIES (MAINTENANCE)	
	K1	ESDG12	EMERGENCY GENERATOR (LINE 1)	EP16
	K2	ESDG13	EMERGENCY GENERATOR (LINE 2)	EP17
	K3	ESFW11	2 EMERGENCY FIRE WATER TANKS	EP18
	K6	ESSH15	8.525 MMBTU/HR MAKEUP AIR HANDLING UNIT	EP19
	K7	ESSH16	7.875 MMBTU/HR MAKEUP AIR HANDLING UNIT	EP22

AREA	STORAGE TANKS
T1	BINDER ROOM
T2	GENERATOR DIESEL
T3	WAX
T4	AMMONIUM HYDROXIDE
T5	ECOSE STORAGE
T6	DIESEL FUEL
T7	GASOLINE STORAGE
T8	KEROSENE

NEW COURT YARD

OFFICE

#1 PRODUCTION LINE (WEST)

#2 PRODUCTION LINE (EAST)

TUMBLER

SCRUBBER CD25A

SCRUBBER CD24B

RTO CD24A

EP 23 EL. 120 FT. E 756.003 N 4365.304

EP14 EL. 120 FT. E 755.923 N 4365.399

RTO CD14A

CD23A

CD23B

CD23C

SCRUBBER

CD13B

CD13A

EP13 EL. 120 FT. E 755.920 N 4365.364

BAG HOUSE CD12B

CD12Bb

EP12 EL. 60 FT. E 755.906 N 4365.365

EP22 EL. 60 FT. E 755.994 N 4365.314

CD22B

CD22Bb

BAG HOUSE

EP 24 EL. 120 FT. E 756.023 N 4365.373

CONTAINMENT AREA

EX. CHAIN LINK FENCE

CONCRETE

ASPHALT

CHEMICAL LOAD / UNLOAD

EMERGENCY GENERATORS

AMMONIUM HYDROXIDE

WV STATE GRID NORTH (ASSC. MONUMENT)

REMOVED K4 & K5, HOTOIL & EMULSION
REVISED BOILER & WATERHEATERS EP21 & EP20
UPDATED TITLE BLOCK LOGO

REV. BY
DATE
REV. BY
DATE
REV. BY
DATE
REV. BY
DATE
REV. BY
DATE
REV. BY
DATE
REV. BY
DATE
REV.1 BY TLH
DATE2/25/2015

MATERIAL:
-

UNLESS OTHERWISE SPECIFIED:
BREAK SHARP EDGES, .02 CHAMFER OR RADIUS

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME (ANSI) Y14.5M-2009

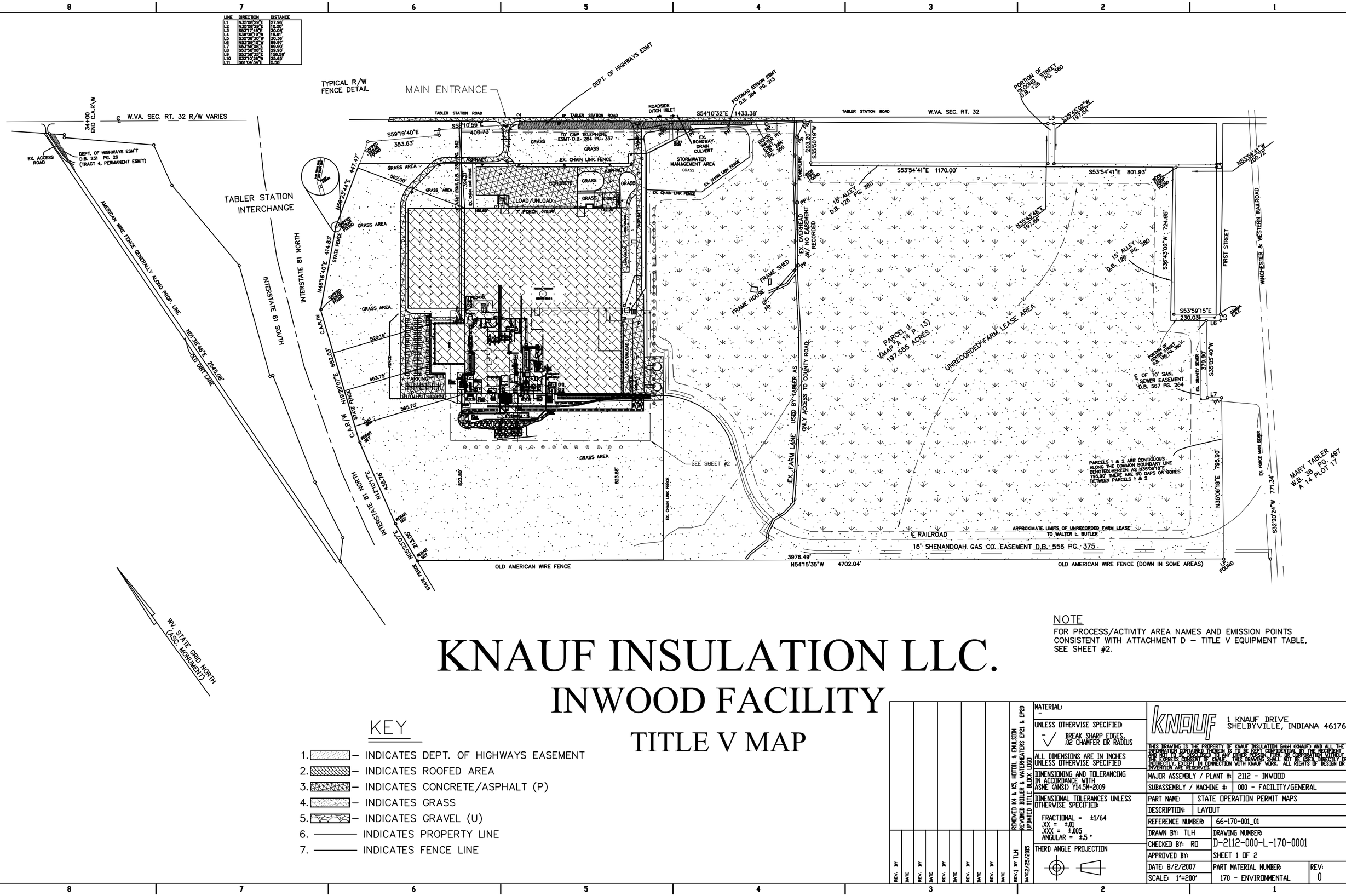
DIMENSIONAL TOLERANCES UNLESS OTHERWISE SPECIFIED:
FRACTIONAL = ±1/64
.XX = ±.01
.XXX = ±.005
ANGULAR = ±.5 °

THIRD ANGLE PROJECTION

KNAUF 1 KNAUF DRIVE SHELBYVILLE, INDIANA 46176

MAJOR ASSEMBLY / PLANT #:	2112 - INWOOD
SUBASSEMBLY / MACHINE #:	000 - FACILITY/GENERAL
PART NAME:	STATE OPERATION PERMIT MAPS
DESCRIPTION:	LAYOUT
REFERENCE NUMBER:	66-170-001_02
DRAWN BY: TLH	DRAWING NUMBER: D-2112-000-L-170-0002
CHECKED BY: RD	
APPROVED BY:	SHEET 2 OF 2
DATE: 8/2/2007	PART MATERIAL NUMBER: 170 - ENVIRONMENTAL
SCALE: 1"=40'	REV: 0

LINE	DIRECTION	DISTANCE
L1	N39°09'29"E	127.98'
L2	N39°08'29"E	10.00'
L3	S53°17'49"E	10.08'
L4	S34°05'10"W	15.81'
L5	S35°06'30"W	30.36'
L6	N53°59'15"W	69.97'
L7	S55°35'08"E	69.90'
L8	S53°39'08"E	29.83'
L9	S53°38'35"E	156.59'
L10	S32°10'26"W	23.05'
L11	S81°04'34"E	9.56'



NOTE

FOR PROCESS/ACTIVITY AREA NAMES AND EMISSION POINTS CONSISTENT WITH ATTACHMENT D – TITLE V EQUIPMENT TABLE, SEE SHEET #2.

KNAUF INSULATION LLC.

INWOOD FACILITY

TITLE V MAP

KEY

1. – INDICATES DEPT. OF HIGHWAYS EASEMENT
2. – INDICATES ROOFED AREA
3. – INDICATES CONCRETE/ASPHALT (P)
4. – INDICATES GRASS
5. – INDICATES GRAVEL (U)
6. ——— INDICATES PROPERTY LINE
7. ——— INDICATES FENCE LINE

REV.	BY	DATE	DESCRIPTION
1	TLH	2/25/2015	REMOVED K4 & K5, HOTOIL & EMULSION BOILER & WATERHEATERS EP21 & EP20 UPDATED TITLE BLOCK LOGO

MATERIAL:
-

UNLESS OTHERWISE SPECIFIED:
BREAK SHARP EDGES, .02 CHAMFER OR RADIUS

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME (ANSI) Y14.5M-2009

DIMENSIONAL TOLERANCES UNLESS OTHERWISE SPECIFIED:
FRACTIONAL = ±1/64
.XX = ±.01
.XXX = ±.005
ANGULAR = ±.5°

THIRD ANGLE PROJECTION

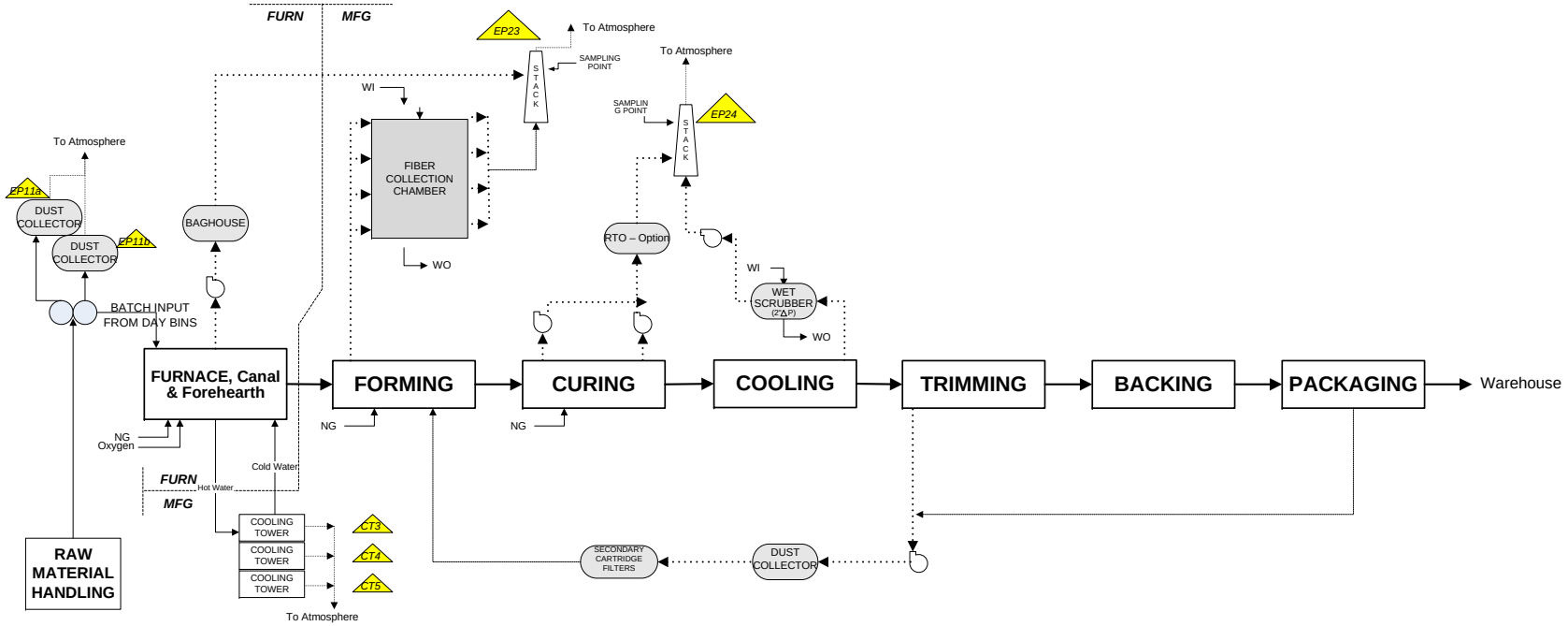
KNAUF
1 KNAUF DRIVE
SHELBYVILLE, INDIANA 46176

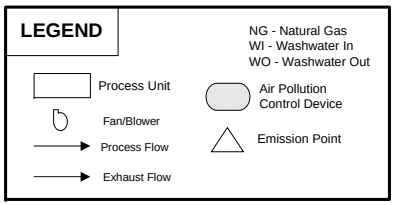
MAJOR ASSEMBLY / PLANT #:	2112 - INWOOD
SUBASSEMBLY / MACHINE #:	000 - FACILITY/GENERAL
PART NAME:	STATE OPERATION PERMIT MAPS
DESCRIPTION:	LAYOUT
REFERENCE NUMBER:	66-170-001_01
DRAWN BY: TLH	DRAWING NUMBER: D-2112-000-L-170-0001
CHECKED BY: RD	
APPROVED BY:	SHEET 1 OF 2
DATE: 8/2/2007	PART MATERIAL NUMBER: 170 - ENVIRONMENTAL
SCALE: 1"=200'	REV: 0

ATTACHMENT F

Detailed Process Flow Diagram

INWOOD ML2INW - PROCESS FLOW DIAGRAM





MINIMUM WET SCRUBBER WATER FLOW - 150 GPM

ATTACHMENT G

Process Description

ATTACHMENT G – PROCESS DESCRIPTION

Knauf Insulation, LLC's (Knauf's) Inwood, West Virginia Facility manufactures fiberglass roll and batt insulation. As part of this application, Knauf is proposing to modify and upgrade an existing wool fiberglass (Line 2).

The facility receives raw materials (variety of natural minerals and manufacturing chemicals, such as silica sand, limestone, and soda ash) that are mixed into batches. Each natural minerals batch is then fed into a furnace for melting. Knauf is proposing a new gas-oxy melting furance as part of this project. Once the glass becomes molten, it is transferred to the forming equipment via a channel (forehearth) located at the end of the furnace. After the forehearth, glass fiber is spun into strands by the means of fiberizers. In bonded fiberglass production, the fine fibers are transferred to a fiber forming section where water, wax and ECOSE binder are added and are collected to form a blanket which is then cured in an oven. Upon exiting the curing oven, the blanket is cooled via a "cooling table". The cooled blanket is then cut to size in rolls and batts of insulation per customer demand and packaged for shipment off-site.

The proposed changes to Line 2 include:

- Installing a new gas oxygen-fueled melting furnace;
- Increase raw material storage capacity;
- Modify the canal/channel and forehearth and associated collection area to accommodate the new furnace flows;
- Modify the fiberizes to Knauf technology (from the previous Guardian technology);
- Convert the binder to an ECOSE binder;
- Increase the capacity of the curing oven by increasing the length of the oven; and
- Upgrade packaging and product handling operations.

Knauf is also planning to install ancillary processes related to Line 2, which include a new emergency generator and cooling towers.

A process flow diagram is included as Attachment F.

ATTACHMENT I

Emission Units Table

Attachment I

Emission Units Table

(includes all emission units and air pollution control devices that will be part of this permit application review, regardless of permitting status)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
ES1A	EP23	Raw Material Storage Bin for Sand	07/25/1998	178.35 tons	Existing	CD1A
ES1B	EP23	Raw Material Storage Bin for Borax	07/25/1998	137.45 tons	Existing	CD1B
ES1C	EP23	Raw Material Storage Bin for Borax	07/25/1998	137.45 tons	Existing	CD1B
ES1D	EP23	Raw Material Storage Bin for Soda Ash	07/25/1998	137.45 tons	Existing	CD1D
ES1E	EP23	Raw Material Storage Bin for Soda Ash	07/25/1998	137.45 tons	Existing	CD1D
ES1F	EP23	Raw Material Storage Bin for Aplite	07/25/1998	137.45 tons	Existing	CD1F
ES1G	EP23	Raw Material Storage Bin for Lime	07/25/1998	109.50 tons	Existing	CD1G
ES1H	EP23	Raw Material Storage Bin for Cullet	07/25/1998	108.50 tons	Existing	CD1I
ES1I	EP23	Raw Material Storage Bin for Cullet	07/25/1998	108.50 tons	Existing	CD1I
ES1J	EP23	Raw Material Storage Bin for Cullet	07/25/1998	137.45 tons	Existing	CD1F
ES1K	EP23	Raw Material Storage Bin for Baghouse Dust	07/25/1998	75.00 tons	Existing	CD1K
ES22A	EP23	Batch Mixers' Receiving Bin For 2nd Line	2004	8000 lbs	Existing	CD22A
ES22B	EP23	Mixed Batch Storage Backup Day Bin for 2nd Line	2004	8000 lbs	Removed	CD22C
ES22Bb	EP23	Mixed Batch Storage Backup Day Bin for 2nd Line	2004	6.675 tons	Removed	CD22C
ES11a	EP11a	Line 2 Day Bin	2017	TBD	New	CD11a
ES11b	EP11b	Line 2 Day Bin	2017	TBD	New	CD11b
T3	FP11	ECOSE Storage Tank	07/25/1998	4,500 gallons	Existing	None
T4	FP11	ECOSE Storage Tank	07/25/1998	4,500 gallons	Existing	None
T5	FP11	ECOSE Storage Tank	07/25/1998	4,500 gallons	Existing	None
T6	FP11	ECOSE Storage Tank	07/25/1998	4,500 gallons	Existing	None
T7A	FP11	Wax Storage Tank	07/25/1998	5,000 gallons	N/A	None
T7B	FP11	Wax Storage Tank	07/25/1998	5,000 gallons	N/A	None
T8	FP11	Ammonia (aqueous) Storage Tank	07/25/1998	6,000 gallons	N/A	None
M1	FP11	Ammonium Sulfate Mix Tank	2015	1,200 gallons	Existing	None

M2	FP11	Ammonium Sulfate Hold Tank	2015	1,700 gallons	Existing	None
M3	FP11	Spare Holding Tank	2015	1,700 gallons	Existing	None
M4	FP11	Filtered Water Hold Tank	2015	3,200 gallons	Existing	None
M5	FP11	Binder Mix Tank	2015	750 gallons	Existing	None
M6	FP11	Binder Holding Tanks	2015	1,700 gallons	Existing	None
ES22	EP23	Line 2 Gas Oxy Melter	2017	6.67 TPH	New	CD22B
ES23	EP23	Line 2 Forehearth, Forming Units and Collection Plenum	2017	6.67 TPH	Modified	CD23
ES24A	EP24	Line 2 Curing Oven and Cooling Table	2004	6.67 TPH	Modified	CD24A (optional) and CD24B
ES25A	EP23	Hot Roll – Facing Application	2004	N/A	Modified	None
ES25B	EP23	Slitter Saw	2004	N/A	Modified	CD25A
ES25C	EP23	Edge Trimmer and Dicers (or Cubes)	2004	N/A	Modified	CD25A
ES25D	EP23	Choppers	2004	N/A	Modified	CD25A
ES25F	EP23	Batt Folder	2004	N/A	Modified	CD25A
ES25G	EP23	Batt Packers	2004	N/A	Modified	CD25A
ES25H	EP23	Dicers or Cubers	2004	N/A	Modified	CD25C and CD25D
ES25I	EP23	Blowing Wool Bagger	2004	N/A	Modified	CD25C and CD25D
ES25J	EP23	Ring Wrapper	2004	N/A	Modified	CD25A
ES25K	EP23	Silicone & Dedusting Oil Application	2004	N/A	Modified	CD25C and CD25D
ES25L	EP23	Blowing Wool Bagger	2004	N/A	Modified	CD25C and CD25D
ESDG14	NEWGEN	Caterpillar C18 Emergency Generator	2017	900HP	New	N/A
CT3-5	CT3-5	Cooling Towers	2017	N/A	New	N/A

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

ATTACHMENT J

Emission Points Data Summary Sheet

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] (ppmv or mg/m^4)
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
EP23	Upward Vertical Stack	ES22, ES23, ES25, Raw Material Handling (Group 1)	Line 2 Gas Oxy Melter, Line 2 Forehearth, Forming, Collection, Line 2 Facing, Sizing Packaging, Line 2 Raw Material Handling	CD22B, CD23, CD25, CD22A, CD22C, CD22D	Baghouse, Fiberglass collection chamber, Cartridge Filters, Bin Vents	NA	NA	NO_X CO PM Filterable $PM_{10}/PM_{2.5}$ VOC SO_2 NH_3 CO_2e	21.40 10.92 8.04 5.37 28.60 6,094	93.73 47.83 35.20 23.54 125.27 26,693	21.40 10.92 19.65 23.84 8.04 5.37 28.60 6,094	93.73 47.83 85.95 104.34 35.20 23.54 125.27 26,693	Solid (PM) Gas/Vapor (other)	A, B, E	
EP11a	Upward Vertical Stack	Raw Material Handling (Group 1)	New Line 2 Day Bin	CD11a	Bin Vent	NA	NA	PM PM_{10} $PM_{2.5}$	2.20 1.10 1.10	3.21 1.61 1.61	0.02 0.01 0.01	0.03 0.02 0.02	Solid (PM)	A	
EP11b	Upward Vertical Stack	Raw Material Handling (Group 1)	New Line 2 Day Bin	CD11b	Bin Vent	NA	NA	PM PM_{10} $PM_{2.5}$	2.20 1.10 1.10	3.21 1.61 1.61	0.02 0.01 0.01	0.03 0.02 0.02	Solid (PM)	A	
EP24	Upward Vertical Stack	ES24	Line 2 Curing Cooling	CD24A, CD24B	Thermal Oxidizer (Optional) Venturi Scrubber	NA	NA	NO_X CO PM Filterable $PM_{10}/PM_{2.5}$ VOC SO_2 NH_3 CO_2e	3.93 8.15 2.60 0.17 2.95 2,951	17.23 35.68 11.39 0.76 12.91 12,925	3.93 8.15 5.87 7.33 2.60 0.17 2.95 2,951	17.23 35.68 25.70 32.12 11.39 0.76 12.91 12,925	Solid (PM) Gas/Vapor (other)	B	

NEWGEN	Upward Vertical Stack	ESDG14	Caterpillar C18 Emergency Generator	NA	NA	NA	NA	NO_X CO VOC SO_2 PM Filterable $PM_{10}/PM_{2.5}$	12.32 1.73 0.14 0.36 0.18 0.18	3.08 0.43 0.04 0.09 0.04 0.04	12.32 1.73 0.14 0.36 0.18 0.18	3.08 0.43 0.04 0.09 0.04 0.04	Solid (PM) Gas/Vapor (other)	C, D	
CT3-5	Upward Vertical Stack	CT3-5	Cooling Towers	NA	Drift Eliminators	NA	NA	PM PM_{10} $PM_{2.5}$	0.14 0.12 0.0005	0.59 0.51 0.002	0.14 0.12 0.0005	0.59 0.51 0.002	Solid (PM)	F	

A- AP-42 Section 11.1 Table 11.13-2
B- Proposed Emission Limits.
C- AP 42 Table 3.4.3
D- Vendor Data
E- USEPA Background Information for Wool Fiberglass Insulation Manufacturing. Page C-65
F- AP 42 Table 13.4.2

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

[1] Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

[2] Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

[3] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. **LIST** Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. **DO NOT LIST** H_2, H_2O, N_2, O_2, and Noble Gases.

[4] Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[5] Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[6] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

[7] Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m^3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO_2, use units of ppmv (See 45CSR10).

Attachment J
EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data								
Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (^{o}F)	Volumetric Flow [1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height [2] *(Release height of emissions above ground level)*	Northing	Easting
EP23	9.5	140	~288,100	67.7	586.5	199	756304.8	4365564.3
EP11a	0.33	70	1,000	191.0	586.5	83.5	756331.3	4365580.2
EP11b	0.33	70	1,000	191.0	586.5	83.5	756334.8	4365578.2
EP24	4.75	350	~70,000	65.6	586.5	120	756348.9	4365591.0
NEWGEN	0.33	994	4,784	914.0	586.5	14	756273.2	4365539.5
CT3	6	85	~110,000	64.8	586.5	29	756335.5	4365544.1
CT4	8	85	~150,000	49.7	586.5	26	756345.3	4365544.5
CT5	8	85	~150,000	49.7	586.5	26	756342.4	4365540.7

[1] Give at operating conditions. Include inerts.
[2] Release height of emissions above ground level.

ATTACHMENT K

Fugitive Emissions Data Summary Sheet

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not typically considered to be fugitive, and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET.

Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
1.) Will there be haul road activities? ☒ Yes ☐ No- minimal truck traffic from semi-trucks ☒ If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? ☐ Yes ☒ No ☐ If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? ☐ Yes ☒ No - Facility has liquid unloading operations, however, they are not affected by this project. ☐ If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)? ☐ Yes ☒ No ☐ If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants - Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	PM PM_{10} $PM_{2.5}$	0.82 0.16 0.04	1.19 0.24 0.06	0.82 0.16 0.04	1.19 0.24 0.06	A
Unpaved Haul Roads	PM PM_{10} $PM_{2.5}$	1.43 0.39 0.04	2.08 0.56 0.06	1.43 0.39 0.04	2.08 0.56 0.06	B
Storage Pile Emissions	NA	---	---	---	---	---
Loading/Unloading Operations	VOC	---	---	---	---	---
Wastewater Treatment Evaporation & Operations	NA	---	---	---	---	---
Equipment Leaks	VOC	---	---	---	---	---
General Clean-up VOC Emissions	NA	---	---	---	---	---
Other	NA	---	---	---	---	---

A – AP 42 13.2.1.3
B- AP 42 13.2.2

[1] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. DO NOT LIST H_2, H_2O, N_2, O_2, and Noble Gases.

[2] Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[3] Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[4] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

ATTACHMENT L

Emission Unit Data Sheet

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): ES22

1. Name or type and model of proposed affected source:

   ML2INW KING Melter
   Gas/Oxygen Fired Melter, Electric/Gas Fired Canal and Electric Forehearth

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

   Approximately 15,334 lb/hr of glass batch mix (sand, soda ash, limestone, limestone, cullet, etc)

4. Name(s) and maximum amount of proposed material(s) produced per hour:

   13,333 lb/hr of molten glass

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

   N/A

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Melter - Natural gas – Total – 2.62 X 10^7 Btu/hr.

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Pipeline quality natural gas with negligible H_2S and ash content.

(c) Theoretical combustion air requirement (ACF/unit of fuel):

Natural Gas/Oxygen fired Melter @ °F and psia.

(d) Percent excess air: NA

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

Knauf Design, Natural Gas/Oxygen – Total 2.62 X 10^7 Btu/hr.

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: 2.62 × 10^7 BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used: **See Attachment N for unit emissions.**

@ Unknown °F and psia

a.	NO_X	20.00	lb/hr	grains/ACF
b.	SO_2	5.20	lb/hr	grains/ACF
c.	CO	3.47	lb/hr	grains/ACF
d.	PM_{10}	1.67	lb/hr	grains/ACF
e.	Hydrocarbons	----	lb/hr	grains/ACF
f.	VOCs	1.30	lb/hr	grains/ACF
g.	Pb		lb/hr	grains/ACF
h.	Specify other(s)			
		---	lb/hr	--- grains/ACF
		---	lb/hr	--- grains/ACF
		---	lb/hr	--- grains/ACF
		---	lb/hr	--- grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
Bag leak detection from melter baghouse Glass pull rate monitoring - cameras	Records of baghouse leak detector alarms Records of glass pull rate
REPORTING	**TESTING**
Semiannual deviation reports	Initial testing within 180 days of start-up and every 5 years thereafter.

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE. METHOD 5 - PM

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): **ES23**

1. Name or type and model of proposed affected source:

   ML2INW Forming

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

   13,333 lb/hr of molten glass

4. Name(s) and maximum amount of proposed material(s) produced per hour:

   13,333 lb/hr of fiberglass insulation

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

   N/A

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Fiberizers - Natural gas – Total – 20 X 10^6 Btu/hr

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Pipeline quality natural gas with negligible H_2S and ash content.

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air: ~ 6%

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

Knauf design natural gas fired – Total – 20 X 10^6 Btu/hr

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: 20 × 10^6 BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ Unknown °F and psia

a.	NO_X	1.40	lb/hr		grains/ACF
b.	SO_2	0.17	lb/hr		grains/ACF
c.	CO	7.45	lb/hr		grains/ACF
d.	PM_{10}	21.40	lb/hr		grains/ACF
e.	Hydrocarbons	---	lb/hr	---	grains/ACF
f.	VOCs	3.21	lb/hr		grains/ACF
g.	Pb	---	lb/hr	---	grains/ACF
h.	Specify other(s)				
	NH_3	28.60	lb/hr		grains/ACF
		---	lb/hr	---	grains/ACF
		---	lb/hr	---	grains/ACF
		---	lb/hr	---	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
Liquid flow rate through fiber collection chamber	Records of liquid flow rate through fiber collection chamber
REPORTING	**TESTING**
Semiannual deviation reports	Initial testing within 180 days of start-up and thereafter every 5 years

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.Following 40 CFR Part 60 Subpart PPP, reporting will occur on a semi-annual basis

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE. METHOD 5E – PM/PM10

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): **ES24**

1. Name or type and model of proposed affected source: ML2INW Curing Oven and Cooling
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: 13,333 lb/hr of fiberglass insulation
4. Name(s) and maximum amount of proposed material(s) produced per hour: 13,333 lb/hr of fiberglass insulation
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: N/A

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Oven burner - Natural gas – Total – 25.2 x 10^6 Btu/hr

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Pipeline quality natural gas with negligible H_2S and ash content.

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air: ~ 6%

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

Oven zones: 5 – 4452 FivesNorth American; Total: 18 x 10^6 BTU/hr
Oven vestibule burners: 2 – 4452 FivesNorth American; Total – 7.2 X 10^6 BTU/hr

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: 25.2 × 10^6 BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used: **Emissions are stack emissions (EP24)**

@ Unknown °F and psia

a.	NO_X	3.93	lb/hr		grains/ACF
b.	SO_2	0.17	lb/hr		grains/ACF
c.	CO	8.15	lb/hr		grains/ACF
d.	PM_{10}	7.33	lb/hr		grains/ACF
e.	Hydrocarbons	---	lb/hr	---	grains/ACF
f.	VOCs	2.60	lb/hr		grains/ACF
g.	Pb	---	lb/hr		grains/ACF
h.	Specify other(s)				
		---	lb/hr	---	grains/ACF
		---	lb/hr	---	grains/ACF
		---	lb/hr	---	grains/ACF
		---	lb/hr	---	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
No controls, except for wet scrubbers, with the conversion to ECOSE binder technology Option of RTO Bed Temperature	No controls, except for wet scrubbers, with the conversion to ECOSE binder technology Option of RTO Bed Temperature
REPORTING	**TESTING**
No controls, except for wet scrubbers, with the conversion to ECOSE binder technology If Option used - Semiannual deviation reports	Initial testing within 180 days of start-up and every 5 years thereafter.

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE. METHOD 5E – PM/PM10

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): **ES25**

1. Name or type and model of proposed affected source:

   ML2INW Facing, Sizing, Packaging

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

   13,333 lb/hr of fiberglass insultation
   ~715,000 gallon dedusting agent per year
   ~3,500 gallon ink per year
   ~30 gallons solvent per year

4. Name(s) and maximum amount of proposed material(s) produced per hour:

   13,333 lb/hr of fiberglass insulation

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

   N/A

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

N/A

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

N/A

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

N/A

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: N/A × 10^6 BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ Unknown °F and psia

a.	NO_X		lb/hr		grains/ACF
b.	SO_2		lb/hr		grains/ACF
c.	CO		lb/hr		grains/ACF
d.	PM_{10}	0.68	lb/hr		grains/ACF
e.	Hydrocarbons	---	lb/hr	---	grains/ACF
f.	VOCs	3.53	lb/hr		grains/ACF
g.	Pb	---	lb/hr	---	grains/ACF
h.	Specify other(s)				
			lb/hr		grains/ACF
		---	lb/hr	---	grains/ACF
		---	lb/hr	---	grains/ACF
		---	lb/hr	---	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
Ink, coating, usage and production rate	Records of inks, coating
REPORTING	**TESTING**
Semiannual deviation reports	None

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING..

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): ESDG14

1. Name or type and model of proposed affected source: Emergency Generator, diesel fired engine
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: N/A
4. Name(s) and maximum amount of proposed material(s) produced per hour: 900 brake horsepower engine, 600 kW generator
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: N/A

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

Diesel – 42.7 gal/hr

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Low sulfur diesel

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air: NA

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

5.85 MMbtu/hr

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: 5.85 × 10^6 BTU/hr.

7. Projected operating schedule:

Hours/Day	0.5	Days/Week	1	Weeks/Year	12

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ Unknown °F and psia

a.	NO_X	12.32	lb/hr	grains/ACF
b.	SO_2	0.36	lb/hr	grains/ACF
c.	CO	1.73	lb/hr	grains/ACF
d.	PM_{10}	0.18	lb/hr	grains/ACF
e.	Hydrocarbons		lb/hr	grains/ACF
f.	VOCs	0.14	lb/hr	grains/ACF
g.	Pb		lb/hr	grains/ACF
h.	Specify other(s)			
		---	lb/hr	--- grains/ACF
		---	lb/hr	--- grains/ACF
		---	lb/hr	--- grains/ACF
		---	lb/hr	--- grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
Hours of operations	Hours of operation, engine maintenance
REPORTING	**TESTING**
None	None

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

Attachment L
FUGITIVE EMISSIONS FROM UNPAVED HAULROADS

UNPAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)

		PM	PM-10
k =	Particle size multiplier	4.9	1.5
s =	Silt content of road surface material (%)	6.4	6.4
p =	Number of days per year with precipitation >0.01 in.	140	140

Item Number	Description	Number of Wheels	Mean Vehicle Weight (tons)	Mean Vehicle Speed (mph)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)
1	Haul Trucks		20	15	0.22	0.45	913		NA
2									
3									
4									
5									
6									
7									
8									

Source: *AP-42 Fifth Edition – 13.2.2 Unpaved Roads*

$E = k \times 5.9 \times (s \div 12) \times (S \div 30) \times (W \div 3)^{0.7} \times (w \div 4)^{0.5} \times ((365 - p) \div 365) =$ lb/Vehicle Mile Traveled (VMT)

Where:

		PM	PM-10
k =	Particle size multiplier	4.9	1.5
s =	Silt content of road surface material (%)	6.4	6.4
S =	Mean vehicle speed (mph)	15	15
W =	Mean vehicle weight (tons)	20	20
w =	Mean number of wheels per vehicle		
p =	Number of days per year with precipitation >0.01 in.	140	140

For lb/hr: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] = lb/hr

For TPY: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] × [Ton ÷ 2000 lb] = Tons/year

SUMMARY OF UNPAVED HAULROAD EMISSIONS

Item No.	PM				PM-10			
	Uncontrolled		Controlled		Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
1	1.43	2.08	1.43	2.08	0.39	0.56	0.39	0.56
2								
3								
4								
5								
6								
7								
8								
TOTALS	1.43	2.08	1.43	2.08	0.39	0.56	0.39	0.56

FUGITIVE EMISSIONS FROM PAVED HAULROADS

INDUSTRIAL PAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)

I =	Industrial augmentation factor (dimensionless)	**See Attachment N for detailed calculations from**
n =	Number of traffic lanes	**Paved roadways.**
s =	Surface material silt content (%)	
L =	Surface dust loading (lb/mile)	

Item Number	Description	Mean Vehicle Weight (tons)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)
1							
2							
3							
4							
5							
6							
7							
8							

Source: *AP-42 Fifth Edition – 11.2.6 Industrial Paved Roads*

$E = 0.077 \times I \times (4 \div n) \times (s \div 10) \times (L \div 1000) \times (W \div 3)^{0.7}$ = lb/Vehicle Mile Traveled (VMT)

Where:

I =	Industrial augmentation factor (dimensionless)	
n =	Number of traffic lanes	
s =	Surface meterial silt content (%)	
L =	Surface dust loading (lb/mile)	
W =	Average vehicle weight (tons)	

For lb/hr: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] = lb/hr

For TPY: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] × [Ton ÷ 2000 lb] = Tons/year

SUMMARY OF PAVED HAULROAD EMISSIONS

Item No.	Uncontrolled		Controlled	
	lb/hr	TPY	lb/hr	TPY
1				
2				
3				
4				
5				
6				
7				
8				
TOTALS				

PERFORMANCE DATA [DM8518]

SEPTEMBER 07, 2016

For Help Desk Phone Numbers Click here

Perf No: DM8518 **Change Level:** 04

General | Heat Rejection | Emissions | Regulatory | Altitude Derate | Cross Reference | Perf Param Ref

View PDF

SALES MODEL:	C18	**COMBUSTION:**	DI
BRAND:	CAT	**ENGINE SPEED (RPM):**	1,800
ENGINE POWER (BHP):	900	**HERTZ:**	60
GEN POWER W/O FAN (EKW):	621.0	**FAN POWER (HP):**	24.1
GEN POWER WITH FAN (EKW):	600.0	**ASPIRATION:**	TA
COMPRESSION RATIO:	14.5	**AFTERCOOLER TYPE:**	ATAAC
RATING LEVEL:	STANDBY	**AFTERCOOLER CIRCUIT TYPE:**	JW+OC, ATAAC
PUMP QUANTITY:	1	**INLET MANIFOLD AIR TEMP (F):**	120
FUEL TYPE:	DIESEL	**JACKET WATER TEMP (F):**	192.2
MANIFOLD TYPE:	DRY	**TURBO CONFIGURATION:**	PARALLEL
GOVERNOR TYPE:	ELEC	**TURBO QUANTITY:**	2
CAMSHAFT TYPE:	STANDARD	**TURBOCHARGER MODEL:**	S310S089 1.10A/R
IGNITION TYPE:	CI	**CERTIFICATION YEAR:**	2006
INJECTOR TYPE:	EUI	**PISTON SPD @ RATED ENG SPD (FT/MIN):**	2,161.4
REF EXH STACK DIAMETER (IN):	6		
MAX OPERATING ALTITUDE (FT):	2,953		

INDUSTRY	SUB INDUSTRY	APPLICATION
OIL AND GAS	LAND PRODUCTION	PACKAGED GENSET
ELECTRIC POWER	STANDARD	PACKAGED GENSET

General Performance Data Top

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	DEG F
600.0	100	900	358	0.332	42.7	69.4	120.2	1,296.3	994.3
540.0	90	808	321	0.339	39.1	66.3	118.8	1,245.6	957.8
480.0	80	718	286	0.350	35.9	63.5	114.4	1,207.1	930.8
450.0	75	674	268	0.356	34.2	61.8	112.9	1,186.7	917.0
420.0	70	629	250	0.361	32.4	59.7	111.6	1,165.0	902.7
360.0	60	541	215	0.369	28.5	53.8	109.2	1,112.0	870.5
300.0	50	454	181	0.373	24.2	45.7	106.7	1,046.3	833.0
240.0	40	370	147	0.368	19.5	33.5	100.1	946.3	779.4
180.0	30	286	114	0.358	14.6	20.4	94.1	835.3	712.8
150.0	25	244	97	0.355	12.4	14.8	92.9	777.5	675.5
120.0	20	201	80	0.354	10.2	9.7	93.2	718.0	635.0
60.0	10	114	45	0.412	6.7	5.3	110.2	594.2	543.7

GENSET POWER WITH	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW	ENGINE OUTLET WET EXH GAS VOL	WET INLET AIR MASS	WET EXH GAS MASS	WET EXH VOL FLOW RATE (32 DEG F AND	DRY EXH VOL FLOW RATE (32 DEG F AND

FAN					RATE	FLOW RATE	FLOW RATE	FLOW RATE	29.98 IN HG)	29.98 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
600.0	100	900	75	412.3	1,687.8	4,784.4	7,408.0	7,706.8	1,617.9	1,451.6
540.0	90	808	72	394.7	1,642.0	4,527.0	6,835.4	7,109.2	1,570.3	1,408.9
480.0	80	718	69	382.3	1,610.2	4,346.8	6,444.6	6,696.2	1,537.1	1,379.1
450.0	75	674	67	375.0	1,585.8	4,235.0	6,219.7	6,459.3	1,512.6	1,357.1
420.0	70	629	65	366.6	1,553.7	4,103.3	5,966.3	6,193.4	1,480.9	1,328.7
360.0	60	541	59	343.2	1,458.4	3,757.4	5,337.4	5,537.1	1,388.9	1,246.1
300.0	50	454	50	310.5	1,320.6	3,305.0	4,563.8	4,733.3	1,257.1	1,127.9
240.0	40	370	37	257.4	1,111.5	2,682.3	3,553.5	3,689.7	1,064.4	955.0
180.0	30	286	23	199.4	884.9	2,022.7	2,525.0	2,627.5	848.2	761.0
150.0	25	244	18	174.4	785.6	1,730.6	2,088.7	2,175.3	749.5	672.5
120.0	20	201	12	151.3	693.2	1,458.1	1,697.2	1,768.4	654.9	587.6
60.0	10	114	7	126.8	597.1	1,145.6	1,226.4	1,273.3	561.4	503.7

Heat Rejection Data Top

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHUAST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
600.0	100	900	10,747	4,902	36,053	25,532	4,927	8,700	38,156	92,511	98,547
540.0	90	808	9,782	4,629	33,384	23,204	4,501	8,019	34,283	84,515	90,030
480.0	80	718	8,986	4,214	31,336	21,497	4,132	7,621	30,466	77,572	82,634
450.0	75	674	8,588	3,960	30,201	20,572	3,935	7,343	28,577	73,883	78,704
420.0	70	629	8,190	3,714	28,948	19,564	3,728	6,995	26,691	69,994	74,562
360.0	60	541	7,280	3,361	25,878	17,120	3,276	6,029	22,961	61,507	65,520
300.0	50	454	6,312	3,082	22,121	14,274	2,778	4,777	19,272	52,156	55,559
240.0	40	370	5,495	2,832	17,303	10,690	2,231	3,160	15,694	41,880	44,613
180.0	30	286	4,715	2,598	12,425	7,201	1,677	1,641	12,128	31,482	33,537
150.0	25	244	4,301	2,088	10,360	5,720	1,416	1,113	10,337	26,580	28,314
120.0	20	201	3,873	1,654	8,496	4,395	1,163	687	8,525	21,841	23,266
60.0	10	114	2,853	1,533	5,930	2,515	768	173	4,826	14,415	15,355

Emissions Data Top

Units Filter All Units

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN ENGINE POWER PERCENT LOAD		EKW BHP %	600.0 900 100	450.0 674 75	300.0 454 50	150.0 244 25	60.0 114 10
TOTAL NOX (AS NO2)		G/HR	5,538	2,437	1,369	1,803	1,161
TOTAL CO		G/HR	774	577	211	226	358
TOTAL HC		G/HR	15	29	65	37	37
PART MATTER		G/HR	58.3	81.9	46.9	19.9	16.8
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	3,022.6	1,643.1	1,364.2	3,552.7	4,023.2
TOTAL CO	(CORR 5% O2)	MG/NM3	421.1	389.9	203.1	444.4	1,292.1
TOTAL HC	(CORR 5% O2)	MG/NM3	7.1	17.6	54.2	59.2	114.4
PART MATTER	(CORR 5% O2)	MG/NM3	26.0	47.3	39.3	33.4	54.7
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,472	800	664	1,730	1,960
TOTAL CO	(CORR 5% O2)	PPM	337	312	162	356	1,034
TOTAL HC	(CORR 5% O2)	PPM	13	33	101	111	214
TOTAL NOX (AS NO2)		G/HP-HR	6.21	3.64	3.02	7.41	10.21
TOTAL CO		G/HP-HR	0.87	0.86	0.47	0.93	3.15
TOTAL HC		G/HP-HR	0.02	0.04	0.14	0.15	0.32
PART MATTER		G/HP-HR	0.07	0.12	0.10	0.08	0.15
TOTAL NOX (AS NO2)		LB/HR	12.21	5.37	3.02	3.97	2.56
TOTAL CO		LB/HR	1.71	1.27	0.46	0.50	0.79

TOTAL HC		LB/HR	0.03	0.06	0.14	0.08	0.08
PART MATTER		LB/HR	0.13	0.18	0.10	0.04	0.04

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN **ENGINE POWER**		**EKW** **BHP**	**600.0** **900**	**450.0** **674**	**300.0** **454**	**150.0** **244**	**60.0** **114**
PERCENT LOAD		**%**	**100**	**75**	**50**	**25**	**10**
TOTAL NOX (AS NO2)		G/HR	5,128	2,257	1,267	1,669	1,075
TOTAL CO		G/HR	414	308	113	121	192
TOTAL HC		G/HR	8	15	35	19	19
TOTAL CO2		KG/HR	422	338	239	122	67
PART MATTER		G/HR	29.9	42.0	24.0	10.2	8.6
TOTAL NOX (AS NO2)	(CORR 5% O2)	MG/NM3	2,798.7	1,521.4	1,263.2	3,289.5	3,725.1
TOTAL CO	(CORR 5% O2)	MG/NM3	225.2	208.5	108.6	237.7	691.0
TOTAL HC	(CORR 5% O2)	MG/NM3	3.8	9.3	28.7	31.3	60.5
PART MATTER	(CORR 5% O2)	MG/NM3	13.3	24.3	20.2	17.2	28.1
TOTAL NOX (AS NO2)	(CORR 5% O2)	PPM	1,363	741	615	1,602	1,814
TOTAL CO	(CORR 5% O2)	PPM	180	167	87	190	553
TOTAL HC	(CORR 5% O2)	PPM	7	17	54	59	113
TOTAL NOX (AS NO2)		G/HP-HR	5.75	3.37	2.80	6.86	9.46
TOTAL CO		G/HP-HR	0.46	0.46	0.25	0.50	1.68
TOTAL HC		G/HP-HR	0.01	0.02	0.08	0.08	0.17
PART MATTER		G/HP-HR	0.03	0.06	0.05	0.04	0.08
TOTAL NOX (AS NO2)		LB/HR	11.30	4.98	2.79	3.68	2.37
TOTAL CO		LB/HR	0.91	0.68	0.25	0.27	0.42
TOTAL HC		LB/HR	0.02	0.03	0.08	0.04	0.04
TOTAL CO2		LB/HR	930	746	528	269	149
PART MATTER		LB/HR	0.07	0.09	0.05	0.02	0.02
OXYGEN IN EXH		%	9.0	10.9	12.5	13.6	15.9
DRY SMOKE OPACITY		%	0.8	1.1	0.9	0.6	0.5
BOSCH SMOKE NUMBER			0.46	0.74	0.54	0.30	0.22

Regulatory Information Top

EPA TIER 2 **2006 - 2010**

GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20

EPA EMERGENCY STATIONARY **2011 - ----**

GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE EMERGENCY STATIONARY REGULATIONS.

Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20

Altitude Derate Data Top

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**	**140**	**NORMAL**
ALTITUDE (FT)													
0	900	900	900	900	900	900	900	900	900	900	900	900	900

1,000	900	900	900	900	900	900	900	900	900	898	882	868	900
2,000	900	900	900	900	900	900	900	895	879	864	850	835	900
3,000	900	900	900	900	900	893	877	861	846	832	818	804	900
4,000	900	900	900	893	876	859	844	829	814	800	787	773	885
5,000	900	893	875	858	842	827	812	797	783	770	757	744	857
6,000	876	858	842	825	810	795	780	766	753	740	727	715	830
7,000	842	825	809	793	778	764	750	736	724	711	699	687	803
8,000	809	793	777	762	748	734	720	708	695	683	672	660	777
9,000	777	761	746	732	718	705	692	680	668	656	645	634	751
10,000	746	731	716	703	689	677	664	652	641	630	619	609	726
11,000	716	701	687	674	661	649	637	626	615	604	594	584	702
12,000	686	673	659	647	635	623	611	601	590	580	570	560	678
13,000	658	645	632	620	608	597	586	576	566	556	546	537	655
14,000	631	618	606	594	583	572	562	552	542	533	524	515	632
15,000	604	592	581	569	559	548	538	529	519	510	502	493	610

Cross Reference Top

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
0K7257	PP5703	2726915	GS338	-	EST00001	

Performance Parameter Reference Top

Parameters Reference: DM9600 - 08

PERFORMANCE DEFINITIONS

PERFORMANCE DEFINITIONS DM9600

APPLICATION:
Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.

PERFORMANCE PARAMETER TOLERANCE FACTORS:
Power +/- 3%
Torque +/- 3%
Exhaust stack temperature +/- 8%
Inlet airflow +/- 5%
Intake manifold pressure-gage +/- 10%
Exhaust flow +/- 6%
Specific fuel consumption +/- 3%
Fuel rate +/- 5%
Specific DEF consumption +/- 3%
DEF rate +/- 5%
Heat rejection +/- 5%
Heat rejection exhaust only +/- 10%
Heat rejection CEM only +/- 10%

Heat Rejection values based on using treated water.

Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.

These values do not apply to C280/3600. For these models, see the tolerances listed below.

C280/3600 HEAT REJECTION TOLERANCE FACTORS:
Heat rejection +/- 10%
Heat rejection to Atmosphere +/- 50%
Heat rejection to Lube Oil +/- 20%
Heat rejection to Aftercooler +/- 5%

TEST CELL TRANSDUCER TOLERANCE FACTORS:

Torque +/- 0.5%
Speed +/- 0.2%
Fuel flow +/- 1.0%
Temperature +/- 2.0 C degrees
Intake manifold pressure +/- 0.1 kPa

OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE AIR AND FUEL CONDITIONS.

REFERENCE ATMOSPHERIC INLET AIR
FOR 3500 ENGINES AND SMALLER
SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other engines, reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity at the stated aftercooler water temp, or inlet manifold temp.

FOR 3600 ENGINES
Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE
Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

REFERENCE EXHAUST STACK DIAMETER
The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed

in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

REFERENCE FUEL

DIESEL

Reference fuel is #2 distillate diesel with a 35API gravity; A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 29 (84.2), where the density is 838.9 G/Liter (7.001 Lbs/Gal).

GAS

Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD

Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional Parasitic losses would also include Intake, and Exhaust Restrictions.

ALTITUDE CAPABILITY

Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set.

Standard temperature values versus altitude could be seen on TM2001.

When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.

Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001.

Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.

REGULATIONS AND PRODUCT COMPLIANCE

TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change

at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative.

Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

EMISSIONS DEFINITIONS:
Emissions : DM1176

HEAT REJECTION DEFINITIONS:
Diesel Circuit Type and HHV Balance : DM9500

HIGH DISPLACEMENT (HD) DEFINITIONS:
3500: EM1500

RATING DEFINITIONS:
Agriculture : TM6008

Fire Pump : TM6009

Generator Set : TM6035

Generator (Gas) : TM6041

Industrial Diesel : TM6010

Industrial (Gas) : TM6040

Irrigation : TM5749

Locomotive : TM6037

Marine Auxiliary : TM6036

Marine Prop (Except 3600) : TM5747

Marine Prop (3600 only) : TM5748

MSHA : TM6042

Oil Field (Petroleum) : TM6011

Off-Highway Truck : TM6039

On-Highway Truck : TM6038

SOUND DEFINITIONS:
Sound Power : DM8702

Sound Pressure : TM7080

Date Released : 7/7/15

ELECTRIC POWER - Technical Spec Sheet
STANDARD

C18 ACERT

600 ekW/ 750 kVA/ 60 Hz/ 1800 rpm/ 480 V/ 0.8 Power Factor

Rating Type: STANDBY

Emissions: U.S. EPA Certified for Stationary Emergency Use Only (Tier 2 Nonroad Equivalent Emission Standards)

Image shown may not reflect actual configuration

C18 ACERT

600 ekW/ 750 kVA

60 Hz/ 1800 rpm/ 480 V

	Metric	English
Package Performance		
Genset Power Rating with Fan @ 0.8 Power Factor	600 ekW	
Genset Power Rating	750 kVA	
Aftercooler (Separate Circuit)	N/A	N/A
Fuel Consumption		
100% Load with Fan	161.6 L/hr	42.7 gal/hr
75% Load with Fan	129.6 L/hr	34.2 gal/hr
50% Load with Fan	91.7 L/hr	24.2 gal/hr
25% Load with Fan	46.8 L/hr	12.4 gal/hr
Cooling System[1]		
Engine Coolant Capacity	20.8 L	5.5 gal
Inlet Air		
Combustion Air Inlet Flow Rate	47.8 m³/min	1687.8 cfm
Max. Allowable Combustion Air Inlet Temp	49 ° C	120 ° F
Exhaust System		
Exhaust Stack Gas Temperature	534.6 ° C	994.3 ° F
Exhaust Gas Flow Rate	135.5 m³/min	4784.4 cfm
Exhaust System Backpressure (Maximum Allowable)	10.0 kPa	40.0 in. water

Rating Type: STANDBY

Emissions: U.S. EPA Certified for Stationary Emergency Use Only (Tier 2 Nonroad Equivalent Emission Standards)

Heat Rejection		
Heat Rejection to Jacket Water	189 kW	10747 Btu/min
Heat Rejection to Exhaust (Total)	634 kW	36053 Btu/min
Heat Rejection to Aftercooler	153 kW	8700 Btu/min
Heat Rejection to Atmosphere from Engine	86 kW	4902 Btu/min
Heat Rejection to Atmosphere from Generator	41 kW	2332 Btu/min

Alternator[2]	
Motor Starting Capability @ 30% Voltage Dip	1633 skVA
Current	902 amps
Frame Size	LC7024F
Excitation	AR
Temperature Rise	150 ° C

Emissions (Nominal)[3]		
NOx	2798.7 mg/Nm³	5.8 g/hp-hr
CO	225.2 mg/Nm³	0.5 g/hp-hr
HC	3.8 mg/Nm³	0.0 g/hp-hr
PM	13.3 mg/Nm³	0.0 g/hp-hr

DEFINITIONS AND CONDITIONS

1. For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.

2. UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40° C ambient per NEMA MG1-32.

3. Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77° F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 btu/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

Rating Type: STANDBY

Emissions: U.S. EPA Certified for Stationary Emergency Use Only (Tier 2 Nonroad Equivalent Emission Standards)

Applicable Codes and Standards:
AS1359, CSA C22.2 No100-04, UL142,UL489, UL869, UL2200,
NFPA37, NFPA70, NFPA99, NFPA110, IBC, IEC60034-1, ISO3046, ISO8528,
NEMA MG1-22,NEMA MG1-33, 2006/95/EC, 2006/42/EC, 2004/108/EC.

Note: Codes may not be available in all model configurations. Please consult your local Cat Dealer representative for availability.

STANDBY: Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions

Fuel Rates are based on fuel oil of 35º API [16º C (60º F)] gravity having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 29º C (85º F) and weighing 838.9 g/liter (7.001 lbs/U.S. gal.). Additional ratings may be available for specific customer requirements, contact your Cat representative for details. For information regarding Low Sulfur fuel and Biodiesel capability, please consult your Cat dealer.

www.Cat-ElectricPower.com

Performance No.: DM8518-04

Feature Code: C18DE6E

Generator Arrangement: 4183897

Date: 09/01/2016

Source Country: U.S.

ATTACHMENT M

Air Pollution Control Device Sheet

Attachment M
Air Pollution Control Device Sheet
(Furnace BAGHOUSE)

Control Device ID No. (must match Emission Units Table): **CD22B – ML2INW Furnace Baghouse**

Equipment Information and Filter Characteristics

1. Manufacturer: ***Final Vendor Selections are ongoing. Once selection complete, data will be submitted under separate cover. The design specifications/control efficiency are not expected to change based on vendor selection.***
Model No. TBD

2. Total number of compartments: 5

3. Number of compartments online for normal operation: 5

4. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.

5. Baghouse Configuration: (check one)
☐ Open Pressure ☒ Closed Pressure ☐ Closed Suction
☐ Electrostatically Enhanced Fabric
☐ Other, Specify

6. Filter Fabric Bag Material:
☐ Nomex nylon ☐ Wool
☐ Polyester ☐ Polypropylene
☐ Acrylics ☐ Ceramics
☐ Fiber Glass
☐ Cotton Weight oz./sq.yd
☐ Teflon Thickness in
☒ Others, specify PTFE

7. Bag Dimension:
Diameter in.
Length ft.

8. Total cloth area: 6,714 ft^2

9. Number of bags:

10. Operating air to cloth ratio: 4.17 ft/min

11. Baghouse Operation: ☐ Continuous ☒ Automatic ☐ Intermittent

12. Method used to clean bags:
☐ Mechanical Shaker ☐ Sonic Cleaning ☐ Reverse Air Jet
☐ Pneumatic Shaker ☐ Reverse Air Flow ☐ Other:
☐ Bag Collapse ☒ Pulse Jet
☐ Manual Cleaning ☐ Reverse Jet

13. Cleaning initiated by:
☒ Timer ☐ Frequency if timer actuated
☐ Expected pressure drop range in. of water ☐ Other

14. Operation Hours: Max. per day: **24** Max. per yr: **8760**

15. Collection efficiency: Rating: %
Guaranteed minimum: ~ 90-95% %

Gas Stream Characteristics

16. Gas flow rate into the collector: 28,100 ACFM at 350-400 °F and PSIA
ACFM: Design: PSIA Maximum: PSIA Average Expected: PSIA

17. Water Vapor Content of Effluent Stream: lb. Water/lb. Dry Air

18. Gas Stream Temperature: 350-400 °F

19. Fan Requirements: hp
OR 28,100 ft^3/min

20. Stabilized static pressure loss across baghouse. Pressure Drop: High in. H_2O
Low in. H_2O

21. Particulate Loading: Inlet: grain/scf Outlet: grain/scf

22. Type of Pollutant(s) to be collected (if particulate give specific type):

Particulate matter – batch dust

23. Is there any SO_3 in the emission stream? ☒ No ☐ Yes SO_3 content: ppmv

24. Emission rate of pollutant (specify) into and out of collector at maximum design operating conditions:

	IN		OUT	
Pollutant	**lb/hr**	**grains/acf**	**lb/hr**	**grains/acf**
Particulate matter	Unknown	Unknown	1.67	.0069
NOx	20.00		20.00	
CO	3.47		3.47	
VOC	1.30		1.30	
SO2	5.20		5.20	

25. Complete the table:

	Particle Size Distribution at Inlet to Collector	**Fraction Efficiency of Collector**
Particulate Size Range (microns)	**Weight % for Size Range**	**Weight % for Size Range**
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

26. How is filter monitored for indications of deterioration (e.g., broken bags)?
- ☐ Continuous Opacity
- ☐ Pressure Drop
- ☐ Alarms-Audible to Process Operator
- ☐ Visual opacity readings, Frequency:
- ☒ Other, specify: Broken bag detector

27. Describe any recording device and frequency of log entries:

pA output of broken bag detector – continuous monitoring with alarm

28. Describe any filter seeding being performed:

None

29. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):

None

30. Describe the collection material disposal system:

Collected dust will be reused back into furnace

31. Have you included ***Baghouse Control Device*** in the Emissions Points Data Summary Sheet? Yes

32. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
pA monitoring	Data acquisition
REPORTING:	TESTING:
Deviation reporting as required in permit	Emissions testing as required in permit

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

33. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

Based on Knauf exhaust design being supplied to manufacturer baghouse is approximately 90-95%

34. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

Manufacturer's guarantee will be detailed once final vendor selection is completed.

35. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

Manufacturer's guarantee will be detailed once final vendor selection is completed.

Attachment M
Air Pollution Control Device Sheet
(WET COLLECTING SYSTEM-SCRUBBER)

Control Device ID No. (must match Emission Units Table): **CD23 (4 units) ML2INW Forming**

Equipment Information

1. Manufacturer: **Knauf Insulation** Model No. **None**	2. Method: ☐ Packed Bed ☐ Venturi ☐ Spray Tower ☐ Cyclone ☐ Mechanical ☐ Orifice ☒ Other, specify
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. Provide a scale diagram of the scrubber showing internal construction. Please include packing type and size, spray configurations, baffle plates, and mist eliminators. Final design and vendor selection still underway. Overall design requirements will be provided under separate cover. Design will be a fiber collection chamber with wet collection.	
5. What type of liquid entrainment eliminators or system will be used? Submit a schematic diagram showing thickness, mesh, and material of construction. Final design and vendor selection still underway. Overall design requirements will be provided under separate cover.	
6. Describe the scrubber's construction material: Stainless steel	
7. What will be the power requirements of the collector? Fan **600** HP Inlet scrubbing liquid pump: **TBD** HP	
8. What type of fan(s) will be used? Type of fan blade: Number of blades: Diameter of blade: in. Also supply a fan curve for each fan to be used.	
9. Estimated gas pressure drop at maximum flow rate: 0-10" design (3-5" expected) inches H_2O	

Scrubbing Liquor Characteristics

10. Scrubbing Liquor

Composition	Weight %
1 **Water**	**100**
2	
3	
4	

11. Scrubbing liquor losses (evaporation, etc.):
Unknown gal/1000 ACF gas

12. Liquor pressure to scrubber: **TBD** PSIA

13. Pressure drop through scrubber: in. H_2O

14. Source of liquor (explain):

Recirculating was water system

15. Liquor flow rates to scrubber:
Design maximum: **300-500** gal/min
Average expected: **150-350** gal/min

16. Describe system to be used to supply liquor to collector:

Closed loop recirculating loop with vibrating screens to remove solids.

17. Give the expected solids content of the liquor:

0.5-1.5%

18. If the liquor is to be recirculated, describe any treatment performed:

None

19. Data for Venturi Scrubber:

Throat Dimensions: **NA**
(Specify Units)

Throat Velocity: **NA** ft/sec

20. Data for Packed Towers:

Type of Packing: **None**

Superficial Gas Velocity through Bed:

Gas Stream Characteristics

21. Gas flow into the collector:

~65,000(each)ACF @**160** °F and 14.7 ± PSIA

22. Gas stream temperature:

Inlet: **150** °F

Outlet: **110** °F

23. Gas flow rate:

Design Maximum: **~65,000 (each)** ACFM

Average Expected: **~65,000 (each)** ACFM

24. Particulate Grain Loading in grains/scf:

Inlet: **Unknown**

Outlet: **Unknown**

25. Emission rate of each pollutant (specify) into and out of collector:

Pollutant	IN		OUT (total)		Guaranteed Minimum Collection Efficiency
	lb/hr	grains/acf	lb/hr	grains/acf	
A PM (filt.)	**Unknown**	**Unknown**	**17.12**	**0.0077**	**TBD**
B PM10/PM2.5	**Unknown**	**Unknown**	**21.40**	**0.0096**	**TBD**
C					
D					
E					

26. Type of pollutant(s) controlled: ☐ SO_x ☐ Odor

☒ Particulate (type): **PM, PM10, PM2.5** ☐ Other:

27. By what method were the uncontrolled emissions calculated? ☐ Material Balance ☐ Stack Test

☐ Pilot Test ☒ Other: **Emission factors from a similar source**

28. Dimensions of stack: Height **199** ft. Diameter **Tapered to 9.5** ft

29. Supply an equilibrium curve and/or solubility data (at various temperatures) for the proposed system.

30. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 100 percent of design rating of collector.

Particulate Distribution

31. Complete the table:	**Particle Size Distribution at Inlet to Collector**	**Fraction Efficiency of Collector**
Particulate Size Range (microns)	**Weight % for Size Range**	**Weight % for Size Range**
0 – 2	**Unknown**	**Unknown**
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

32. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):

None

33. Describe the collection material disposal system:

Solids screened from wash water. Solids disposed of in landfill.

34. Have you included ***Wet Collecting (Scrubber) Control Device*** in the Emissions Points Data Summary Sheet?
Yes

35. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
Liquid flow rate (gpm)	Liquid flow rate (gpm)
REPORTING: Semiannual deviation reporting	TESTING: Initial testing within 180 days of start-up and every 5 years thereafter

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

36. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

Unknown

37. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

Unknown

38. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

Periodic preventative maintenance and cleaning as required.

Attachment M
Air Pollution Control Device Sheet
(WET COLLECTING SYSTEM-SCRUBBER)

Control Device ID No. (must match Emission Units Table): **CD24B Cooling**

Equipment Information

1. Manufacturer: **Knauf Insulation**

   Model No. None

2. Method: ☐ Packed Bed ☒ Venturi ☐ Spray Tower ☐ Cyclone ☐ Mechanical ☐ Orifice ☐ Other, specify

3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.

4. Provide a scale diagram of the scrubber showing internal construction. Please include packing type and size, spray configurations, baffle plates, and mist eliminators. Final design and vendor selection still underway. Overall design requirements will be provided under separate cover.

5. What type of liquid entrainment eliminators or system will be used? Submit a schematic diagram showing thickness, mesh, and material of construction.

6. Describe the scrubber's construction material:

   Stainless steel

7. What will be the power requirements of the collector?

   Fan **TBD** HP Inlet scrubbing liquid pump: **TBD** HP

8. What type of fan(s) will be used?

   Type of fan blade: Number of blades: Diameter of blade: in.

   Also supply a fan curve for each fan to be used.

9. Estimated gas pressure drop at maximum flow rate: 0-10" design (3-5" expected) inches H_2O

Scrubbing Liquor Characteristics

10. Scrubbing Liquor

Composition	Weight %
1 Water	100
2	
3	
4	

11. Scrubbing liquor losses (evaporation, etc.):
    Unknown gal/1000 ACF gas

12. Liquor pressure to scrubber: **20-40** PSIA

13. Pressure drop through scrubber: **3-10** in. H_2O

14. Source of liquor (explain):
    Recirculating was water system

15. Liquor flow rates to scrubber:
    Design maximum: **200** gal/min
    Average expected: **50-150** gal/min

16. Describe system to be used to supply liquor to collector:

    Closed loop recirculating loop with vibrating screens to remove solids.

17. Give the expected solids content of the liquor:

    0.5-1.5%

18. If the liquor is to be recirculated, describe any treatment performed:

None

19. Data for Venturi Scrubber:

Throat Dimensions: **TBD**
(Specify Units)

Throat Velocity: **TBD** ft/sec

20. Data for Packed Towers:

Type of Packing: **None**

Superficial Gas Velocity through Bed:

Gas Stream Characteristics

21. Gas flow into the collector:

10-20,000 ACF @ **160** °F and PSIA

22. Gas stream temperature:

Inlet: **150** °F

Outlet: **120** °F

23. Gas flow rate:

Design Maximum: **~20,000** ACFM

Average Expected: **~20,000** ACFM

24. Particulate Grain Loading in grains/scf:

Inlet: **Unknown**

Outlet: **Unknown**

25. Emission rate of each pollutant (specify) into and out of collector:

Pollutant	IN		OUT		Guaranteed Minimum Collection Efficiency
	lb/hr	grains/acf	lb/hr	grains/acf	
A PM (filt.)	**Unknown**	**Unknown**	**5.87**	**0.0098**	**Unknown**
B PM10/PM2.5	**Unknown**	**Unknown**	**7.33**	**0.0122**	**Unknown**
C					
D					
E					

26. Type of pollutant(s) controlled: ☐ SO_x ☐ Odor

☒ Particulate (type): **PM, PM10, PM2.5** ☐ Other:

27. By what method were the uncontrolled emissions calculated? ☐ Material Balance ☐ Stack Test

☐ Pilot Test ☒ Other: **Emission factors from a similar source**

28. Dimensions of stack: Height **120** ft. Diameter **4.75** ft

29. Supply an equilibrium curve and/or solubility data (at various temperatures) for the proposed system.

30. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 100 percent of design rating of collector.

Particulate Distribution

31. Complete the table:	**Particle Size Distribution at Inlet to Collector**	**Fraction Efficiency of Collector**
Particulate Size Range (microns)	**Weight % for Size Range**	**Weight % for Size Range**
0 – 2	**Unknown**	**Unknown**
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

32. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):

None

33. Describe the collection material disposal system:

Solids screened from wash water. Solids disposed of in landfill.

34. Have you included ***Wet Collecting (Scrubber) Control Device*** in the Emissions Points Data Summary Sheet? **Yes**

35. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
Scrubber Pressure drop and liquid flow	Scrubber Pressure drop and liquid flow
REPORTING:	TESTING:
Semiannual deviation reporting	Initial testing within 180 days of start-up and every 5 years thereafter

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

36. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

Unknown

37. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

Unknown

38. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

Periodic preventative maintenance and cleaning as required.

Attachment M
Air Pollution Control Device Sheet
(AFTERBURNER SYSTEM)

Control Device ID No. (must match Emission Units Table): CD24A (Curing RTO) - No Changes

Equipment Information

1. Manufacturer: McGill AirClean Model No. MCT 30.0	2. ☐ Thermal Energy Recovery ☐ Recuperative (Conventional) ☐ Catalytic
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. Combustion chamber dimensions: Length: ft Diameter: ft Cross-sectional area: ft^2	5. Stack Dimensions: Height: 120 ft Diameter: 4.75 ft
6. Combustion (destruction) efficiency: Estimated: % Minimum guaranteed: %	7. Retention or residence time of materials in combustion chamber: Maximum: sec Minimum: sec
8. Throat diameter: ft	9. Combustion Chamber Volume: ft^3
10. Fuel used in burners: ☒ Natural Gas ☐ Fuel Oil, Number: ☐ Other, specify:	11. Burners per afterburner: Number of burners: 1 BTU/hr for burner: BTU/hr
12. Fuel heating value of natural gas: BTU/lb	13. Flow rate of natural gas: 1.785 MM ft^3/min
14. Is a catalyst material used?: ☐ Yes ☒ No If yes, catalyst material used:	15. Expected frequency of catalyst replacement: yr(s) 16. Date catalyst was last replaced: Month/Year:
17. Space Velocity of the catalyst material used: 1/hour	18. Catalyst area: ft^2 19. Volume of catalyst bed: ft^3
20. Minimum loading: Maximum loading:	21. Temperature catalyst bed inlet: °F Temperature catalyst bed outlet: °F
22. Explain degradation or performance indicator criteria determining catalyst replacement:	
23. Heat exchanger used? ☐ Yes ☐ No Describe heat exchanger:	24. Heat exchanger surface area? ft^2 25. Average thermal efficiency: %
26. Temperature of gases: After preheat: °F	Before preheat: °F
27. Dilution air flow rate: ft^3/minute	
28. Describe method of gas mixing used:	

Waste Gas (Emission Stream) to be Burned

29.

Name	Quantity Grains of H_2S/100 ft^2	Quantity-Density (LB/hr, ft^3/hr, etc)	Source of Material

30. Estimate total combustibles to afterburner lb/hr or ACF/hr

31. Estimated total flow rate to afterburner or catalyst including materials to be burned, carrier gases, auxiliary fuel, etc.: lb/hr, ACF/hr, or scfm

Total flow rate = Flue gas flow rate

32. Afterburner operating parameters:

	During maximum operation of feeding unit(s)	During typical operation of feeding unit(s)	During minimum operation of feeding unit(s)
Combustion chamber temperature in °F	1500 (or avg. temp	1500 (or avg. temp	1500 (or avg. temp
Emission stream gas temperature in	during most recent	during most recent	during most recent
Combined gas stream entering catalyst bed in	compliant stack test)	compliant stack test)	compliant stack
Flue stream leaving the catalyst bed			
Emission stream flow rate (scfm)			
Efficiency (VOC Reduction)	%	%	%
Efficiency (Other; specify contaminant)	%	%	%

33. Inlet Emission stream parameters:

	Maximum	Typical
Pressure (mmHg):		
Heat Content (BTU/scf):		
Oxygen Content (%):		
Moisture Content (%):		

Are halogenated organics present? ☐ Yes ☐ No
Are particulates present? ☐ Yes ☐ No
Are metals present? ☐ Yes ☐ No

34. For thermal afterburners, is the combustion chamber temperature continuously monitored and recorded?
☒ Yes ☐ No

35. For catalytic afterburners, is the temperature rise across the catalyst bed continuously monitored and recorded? ☐ Yes ☐ No

36. Is the VOC concentration of exhaust monitored and recorded? ☐ Yes ☒ No

37. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):

38. Describe the collection material disposal system:

39. Have you included ***Afterburner Control Device*** in the Emissions Points Data Summary Sheet? Yes

40. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
3 hour average - Combustion chamber temperature	Chamber temperature
REPORTING:	**TESTING:**
Semiannual reporting	Initial testing within 180 days of start-up and every 5 years thereafter

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

41. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.
98%

42. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
94%

43. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.
N/A

Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): CD25 (2 units)

Equipment Information

1. Manufacturer: Model No. TBD	2. Control Device Name: Type: Facing, Sizing, and Packaging Cartridge Filters
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: PM - 100% PM10 – 100% PM2.5 – 100%	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 15,000 ACFM (each	10. Capacity: 15,000 ACFM (each)
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse of disposal. TBD	

Gas Stream Characteristics

14. Are halogenated organics present?	☐ Yes	☒ No
Are particulates present?	☒ Yes	☐ No
Are metals present?	☐ Yes	☒ No

15. Inlet Emission stream parameters:	**Maximum**	**Typical**
Pressure (mmHg):	TBD	TBD
Heat Content (BTU/scf):	N/A	N/A
Oxygen Content (%):	Variable	Variable
Moisture Content (%):	Variable	Variable
Relative Humidity (%):	Variable	Variable

16. Type of pollutant(s) controlled: ☐ SO_x ☐ Odor
☒ Particulate (type): PM, PM10, PM2.5 ☐ Other

17. Inlet gas velocity: ft/sec

18. Pollutant specific gravity: TBD

19. Gas flow into the collector:
15,000 ACF @ 70 °F and 14.7 PSIA

20. Gas stream temperature:
Inlet: 70 °F
Outlet: 70 °F

21. Gas flow rate:
Design Maximum: 15,000 ACFM (each)
Average Expected: 15,000 ACFM (each)

22. Particulate Grain Loading in grains/scf:
Inlet:
Outlet: ~0.005

23. Emission rate of each pollutant (specify) into and out of collector:

Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr (each)	grains/acf (each)		lb/hr (each)	grains/acf (each)	
PM			100%	0.32	~0.005	~99%
PM10			100%	0.32	~0.005	~99%
PM2.5			100%	0.32	~0.005	~99%
D						
E						

24. Dimensions of stack: Height N/A – Exhausts in-plant ft. Diameter NA – Exhausts in-plant ft.

25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.

Particulate Distribution

26. Complete the table:	Particle Size Distribution at Inlet to Collector	Fraction Efficiency of Collector
Particulate Size Range (microns)	Weight % for Size Range	Weight % for Size Range
0 – 2	Unknown	
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): None

28. Describe the collection material disposal system: TBD

29. Have you included ***Other Collectores Control Device*** in the Emissions Points Data Summary Sheet? Yes

30. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING: TBD	RECORDKEEPING: TBD
REPORTING: TBD	TESTING: TBD

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. Estimated at 99% for PM, PM10, and PM2.5

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant. See answer above

33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty. TBD

Attachment M
Air Pollution Control Device Sheet
(OTHER COLLECTORS)

Control Device ID No. (must match Emission Units Table): CD11a and CD11b

Equipment Information

1. Manufacturer: Model No. TBD	2. Control Device Name: Type: Bin Vent Cartridge Filters
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: PM - 100% PM10 – 100% PM2.5 – 100%	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: 1,000 (each) ACFM	10. Capacity: 1,000 ACFM (each)
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any. N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment.	
13. Description of method of handling the collected material(s) for reuse of disposal. TBD	

Gas Stream Characteristics

14. Are halogenated organics present?	☐ Yes	☒ No
Are particulates present?	☒ Yes	☐ No
Are metals present?	☐ Yes	☒ No

15. Inlet Emission stream parameters:	**Maximum**	**Typical**
Pressure (mmHg):	TBD	TBD
Heat Content (BTU/scf):	N/A	N/A
Oxygen Content (%):	Variable	Variable
Moisture Content (%):	Variable	Variable
Relative Humidity (%):	Variable	Variable

16. Type of pollutant(s) controlled: ☐ SO_x ☐ Odor
☒ Particulate (type): PM, PM10, PM2.5 ☐ Other

17. Inlet gas velocity: 191 (each) ft/sec

18. Pollutant specific gravity: TBD

19. Gas flow into the collector:
1,000 ACF @ 70 °F and 14.7 PSIA

20. Gas stream temperature:
Inlet: 70 °F
Outlet: 70 °F

21. Gas flow rate:
Design Maximum: 1,000 (each) ACFM
Average Expected: 1,000 (each) ACFM

22. Particulate Grain Loading in grains/scf:
Inlet: 0.26
Outlet: 0.003

23. Emission rate of each pollutant (specify) into and out of collector:

Pollutant	IN Pollutant		Emission Capture Efficiency %	OUT Pollutant		Control Efficiency %
	lb/hr (each)	grains/acf (each)		lb/hr (each)	grains/acf (each)	
PM	2.20	0.26	100%	0.02	~0.003	99%
PM10	1.10	0.13	100%	0.01	~0.001	99%
PM2.5	1.10	0.13	100%	0.01	~0.001	99%
D						
E						

24. Dimensions of stack: Height 83.54 ft. Diameter 0.33 ft.

25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.

Particulate Distribution

26. Complete the table: Particulate Size Range (microns)	Particle Size Distribution at Inlet to Collector: Weight % for Size Range	Fraction Efficiency of Collector: Weight % for Size Range
0 – 2	Unknown	
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): None

28. Describe the collection material disposal system: TBD

29. Have you included ***Other Collectores Control Device*** in the Emissions Points Data Summary Sheet? Yes

30. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING: TBD	RECORDKEEPING: TBD
REPORTING: TBD	TESTING: TBD

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

31. Manufacturer's Guaranteed Control Efficiency for each air pollutant. Estimated at 99% for PM, PM10, and PM2.5

32. Manufacturer's Guaranteed Control Efficiency for each air pollutant. See answer above

33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty. TBD

ATTACHMENT N

Supporting Emission Calculations

Table 1. NSR Applicability Analysis Summary

	Projected Actual Emissions (tpy)									Baseline Actual Emissions (tpy)								
Pollutant	Raw Material Handling	Furnace	Forming	Curing and Cooling	Facing, Sizing, Packaging	Generator	Roads	Cooling Towers	**Total**	Raw Material Handling	Furnace	Forming	Curing and Cooling	Facing, Sizing, Packaging	Generator	Roads	Cooling Towers	**Total**
NO_X	--	87.6	6.1	17.2	--	3.08	--	--	114.0	--	0.0	0.5	6.3	--	0.0	--	--	6.8
CO	--	15.2	32.6	35.7	--	0.43	--	--	83.9	--	0.0	43.1	1.8	--	0.0	--	--	44.8
PM Filt	0.7	7.3	75.0	25.7	3.0	0.04	3.3	0.6	115.6	0.4	0.0	14.3	1.3	0.04	0.0	0	0	16.0
PM_{10}	0.4	7.3	93.7	32.1	3.0	0.04	0.8	0.5	137.8	0.2	0.0	14.3	1.3	0.04	0.0	0	0	15.8
$PM_{2.5}$	0.4	7.3	93.7	32.1	3.0	0.04	0.1	0.00	136.6	0.2	0.0	14.3	1.3	0.04	0.0	0	0	15.8
VOC	--	5.7	14.0	11.4	15.5	0.04	--	--	46.6	--	0.0	2.3	0.6	1.6	0.0	--	--	4.5
SO_2	--	22.8	0.8	0.8	--	0.09	--	--	24.4	--	0.0	0.0	0.0	--	0.0	--	--	0.0
CO_2e	2998	13438	10258	12925	--	233.40	--	--	39851	775	0.0	2,440	4,574	--	0.0	--	--	7788.5

	Capable of Accommodating Emissions									Demand Growth Exclusion Emissions								
Pollutant	Raw Material Handling	Furnace	Forming	Curing and Cooling	Facing, Sizing, Packaging	Generator	Roads	Cooling Towers	**Total**	Raw Material Handling	Furnace	Forming	Curing and Cooling	Facing, Sizing, Packaging	Generator	Roads	Cooling Towers	**Total**
NO_X	--	0	0.8	11.1	--	--	--	--	11.9	--	0	0.3	4.7	--	0	--	--	5.1
CO	--	0	32.6	3.1	--	--	--	--	35.7	--	0	0.0	1.3	--	0	--	--	1.3
PM Filt	0.6	0	25.0	2.3	0.1	0	--	0	27.9	0.3	0	10.7	1.0	0.0	0	0	0	12.0
PM_{10}	0.3	0	25.0	2.3	0.1	0	--	0	27.6	0.1	0	10.7	1.0	0.0	0	0	0	11.8
$PM_{2.5}$	0.3	0	25.0	2.3	0.1	0	--	0	27.6	0.1	0	10.7	1.0	0.0	0	0	0	11.8
VOC	--	0	4.1	1.0	7.9	--	--	--	13.0	--	0	1.8	0.4	6.3	0	--	--	8.5
SO_2	--	0	0.0	0.0	--	--	--	--	0.0	--	0	0.0	0.0	--	0	--	--	0.0
CO_2e	1355	0	4,187	7,850	--	--	--	--	13392.4	581	0	1747	3276	--	0	--	--	5603.9

Table 1. NSR Applicability Analysis Summary

	Projected Actual Emissions (excluding demand growth emissions) (tpy)									Baseline Actual Emissions (tpy)								
Pollutant	Raw Material Handling	Furnace	Forming	Curing and Cooling	Facing, Sizing, Packaging	Generator	Roads	Cooling Towers	**Total**	Raw Material Handling	Furnace	Forming	Curing and Cooling	Facing, Sizing, Packaging	Generator	Roads	Cooling Towers	**Total**
NO_X	--	87.6	5.8	12.5	--	3.1	--	--	109.0	--	0	0.5	6.3	--	0	--	--	6.8
CO	--	15.2	32.6	34.4	--	0.4	--	--	82.6	--	0	43.1	1.8	--	0	--	--	44.8
PM Filt	0.4	7.3	64.3	24.7	2.9	0.0	3.3	0.6	103.6	0.4	0	14.3	1.3	0.04	0	0	0.0	16.0
PM_{10}	0.2	7.3	83.0	31.2	2.9	0.0	0.8	0.5	126.0	0.2	0	14.3	1.3	0.04	0	0	0.0	15.8
$PM_{2.5}$	0.2	7.3	83.0	31.2	2.9	0.0	0.1	0.0	124.8	0.2	0	14.3	1.3	0.04	0	0	0.0	15.8
VOC	--	5.7	12.3	11.0	9.1	0.0	--	--	38.1	--	0	2.3	0.6	1.6	0	--	--	4.5
SO_2	--	22.8	0.8	0.8	--	0.1	--	--	24.4	--	0	0.0	0.0	--	0	--	--	0.0
CO_2e	2,417	13,438	8,510	9,649	--	233	--	--	34247	775	0	2440	4574	--	0	--	--	7788

	Project Emissions Increases										
Pollutant	Raw Material Handling	Furnace	Forming	Curing and Cooling	Facing, Sizing, Packaging	Generator	Roads	Cooling Towers	**Total**	**Significant Emission Rate (tpy)**	**Above Significant Emission Rate?**
NO_X	--	87.6	5.3	6.2	--	3.1	--	--	102.2	40	Yes
CO	--	15.2	0.0	32.6	--	0.4	--	--	48.2	100	No
PM Filt	0.1	7.3	50.0	23.4	2.9	0.04	3.3	0.6	87.6	25	Yes
PM_{10}	0.03	7.3	68.8	29.9	2.9	0.04	0.8	0.5	110.2	15	Yes
$PM_{2.5}$	0.03	7.3	68.8	29.9	2.9	0.04	0.1	0.002	109.0	10	Yes
VOC	--	5.7	10.0	10.4	7.6	0.04	--	--	33.7	40	No
SO_2	--	22.8	0.7	0.8	--	0.1	--	--	24.4	40	No
CO_2e	1642	13438	6071	5074	--	233	--	--	26459	75000	No

Table 2. Line 2 Future Emissions Summary

Process unit	**Emission**	**Emission**	PM		PM_{10}		$PM_{2.5}$		VOC		NO_X		CO		SO_2		CO_2e	
Description	**Unit ID**	**Point ID**	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Raw Material Handling	--	23	0.19	0.70	0.09	0.35	0.09	0.35	--	--	--	--	--	--	--	--	684.40	2,997.67
Furnace	22	23	1.67	7.30	1.67	7.30	1.67	7.30	1.30	5.69	20.00	87.60	3.47	15.18	5.20	22.78	3,068	13,438
Forming	23	23	17.12	74.99	21.40	93.73	21.40	93.73	3.21	14.05	1.40	6.13	7.45	32.65	0.17	0.76	2,342	10,258
Curing and Cooling	24	24	5.87	25.70	7.33	32.12	7.33	32.12	2.60	11.39	3.93	17.23	8.15	35.68	0.17	0.76	2,951	12,925
Facing, Sizing, Packaging	--	23	0.68	2.96	0.68	2.96	0.68	2.96	3.53	15.46	--	--	--	--	--	--	--	--
New Emergency Generator	TBD	TBD	0.18	0.04	0.18	0.04	0.18	0.04	0.14	0.04	12.32	3.08	1.73	0.43	0.36	0.09	934	233
New Cooling Towers	TBD	TBD	0.14	0.59	0.12	0.51	0.00	0.00	--	--	--	--	--	--	--	--	--	--
Roads	--	--	2.25	3.28	0.55	0.80	0.08	0.11	--	--	--	--	--	--	--	--	--	--
Total			**28.08**	**115.56**	**32.02**	**137.82**	**31.43**	**136.63**	**10.78**	**46.63**	**37.65**	**114.04**	**20.79**	**83.94**	**5.91**	**24.39**	**9,979**	**39,851**

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Table 3. Raw Materials Handling Future Emission Calculations, FP-11

Source	Emission Factor[1] (lbs/ton of material processed)	
	PM	PM_{10}
Unloading and conveying (SCC 3-05-012-21)	3.0	1.5
Storage bins (SCC 3-05-012-22)	0.2	0.1
Mixing and weighing (SCC 3-05-012-23)	0.6	0.3

1. EPA AP-42, Section 11.13, Table 11.13-2 for PM data. PM10 data from EPA WebFIRE database based on SCC code.

The tons of raw material processed is equivalent to 115% of the maximum production capacity specified.
The maximum production capacity is **13,333** lb/hr and **58,400** tons per year (tpy) based on 8,760 operational hours per year.
Therefore, the maximum raw material processed is equal to **15,333** lb/hr and **67,160** tpy based on 8,760 operational hours per year.

The particulate matter emissions from raw material handling are controlled with bag filter dust collectors, as well as process enclosures.
The use of process enclosures and bag filter dust collectors were determined to have a minimum overall control device efficiency of **99%**

In addition, due to the slight negative on the building, these emissions, which are vented indoors, will be routed to the forming section and, ultimately, the forming and collection stack (EP23). As such, the emissions will be furthe
controlled by the fiber collection chamber. The additional control is estimate at **50%**

E_{PM} = (Production Rate, tons per unit time) x (PM Emission Factor) x (1 - 0.99)

Source	Uncontrolled						Controlled					
	PM		PM_{10}		$PM_{2.5}$[1]		PM		PM_{10}		$PM_{2.5}$[1]	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Unloading and conveying (SCC 3-05-012-21)	23.00	100.74	11.50	50.37	11.50	50.37	0.12	0.50	0.06	0.25	0.06	0.25
Storage bins (SCC 3-05-012-22)	1.53	6.72	0.77	3.36	0.77	3.36	0.01	0.03	0.00	0.02	0.00	0.02
Mixing and weighing (SCC 3-05-012-23)	4.60	20.15	2.30	10.07	2.30	10.07	0.02	0.10	0.01	0.05	0.01	0.05
Total	29.13	127.60	14.57	63.80	14.57	63.80	0.15	0.64	0.07	0.32	0.07	0.32

1. Assumes all PM_{10} is $PM_{2.5}$

New Storage bin Throughputs:
Throughput: 176 tpd of batch (total for two bins)
Each Bin: 32120 tpy

Storage bins are controlled by bin vents. Estimated minimum control device efficiency of **99%**

New Day Bins - Dedicated Release Points (Bin Vents) - ES11a, ES11b

Source	Uncontrolled						Controlled					
	PM		PM_{10}		$PM_{2.5}$[1]		PM		PM_{10}		$PM_{2.5}$[1]	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Storage bins (SCC 3-05-012-22), each	2.20	3.21	1.10	1.61	1.10	1.61	0.02	0.03	0.01	0.02	0.01	0.02

1. Assumes all PM_{10} is $PM_{2.5}$
2. Hourly emissions assume 8 hours of operation per day.

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Table 4. Melting and Refining Future Emission Calculations - Line #2 (Emission Point EP22)

Operational hours	8,760	hr/yr
Line 2 Total Production Rate	13,333	lb/hr
Line 2 Total Production Pull Rate	58,400	ton/yr

Pollutant	Emission Factor (lbs/ton of glass pulled)	Source	Emissions lb/hr	Emissions tpy
NO_X	3.00	1	20.00	87.60
CO	0.52	1	3.47	15.18
Filterable PM	0.25	2	1.67	7.30
PM_{10}	0.25	3	1.67	7.30
$PM_{2.5}$	0.25	3	1.67	7.30
VOC	0.20	1	1.30	5.69
SO_2	0.78	1	5.20	22.78

1 Proposed limit

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Table 5. Forming Future Emission Calculations - Line #2 (Emission Point EP23)

Operational hours	8,760	hr/yr
Line 2 Total Production Rate	13,333	lb/hr
Line 2 Total Production Pull Rate	58,400	ton/yr

Pollutant	Emission Factor (lbs/ton of glass pulled)	Source	Emissions lb/hr	Emissions tpy
NO_X	0.21	1	1.40	6.13
CO	1.12	1	7.45	32.65
Filterable PM	2.57	1	17.12	74.99
PM_{10}	3.21	1	21.40	93.73
$PM_{2.5}$	3.21	1	21.40	93.73
VOC	0.48	1	3.21	14.05
SO_2	0.03	1	0.17	0.76
NH_3	4.29	1	28.60	125.27

1. Proposed limit.

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Table 6. Curing and Cooling Future Emission Calculations - Line #2 (Emission Point EP24)

Operational hours	8,760	hr/yr
Line 2 Total Production Rate	13,333	lb/hr
Line 2 Total Production Pull Rate	58,400	ton/yr

Pollutant	Emission Factor (lbs/ton of glass pulled)	Source	Emissions lb/hr	Emissions tpy
NO_X	0.59	1	3.93	17.23
CO	1.22	1	8.15	35.68
Filterable PM	0.88	1	5.87	25.70
PM_{10}	1.10	1	7.33	32.12
$PM_{2.5}$	1.10	1	7.33	32.12
VOC	0.39	1	2.60	11.39
SO_2	0.03	1	0.17	0.76
NH_3	0.44	1	2.95	12.91

1. Proposed limit.

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Table 7. Facing, Sizing and Packaging Future Emission Calculations - Line 2 Associated Emissions

Historical asphalt facing application has been	0.045	ton per ton glass pulled based on recent production history (maximum value from 2007-2013).
The projected glass pull rate is	58,400	tpy
The projected use of asphalt facing application is	2,628	tpy of facing material processed.

The emissions from the facing application are uncontrolled and released to the in-plant environment. Due to the slight negative pressure on the building, these emissions, which are vented indoors, will be routed to the forming section and, ultimately, the form and collection stack (EP23). As such, the emissions will be further controlled by the fiber collection chamber.
Therefore, the estimated PM emissions released to the in-plant environment from the facing was reduced by 90%

Sample Calculation:

E = (Material Rate, tons per unit time) x (Emission Factor) x (1 - PM Control Efficiency, 90)

Pollutant	Factor[1,2] (lbs/ton of material processed)	Emissions[3] lb/hr	tpy
PM	0.05	0.03	0.15
VOC	1.86	0.56	2.44

1. PM emission factor is lb per ton of wool processed from page C-65 of "Wool Fiberglass Insulation Manufacturing - Background Information for Proposed Standards" USEPA-450-3-82-022a. Assumes all PM is $PM_{2.5}$
2. A representative (conservative) VOC emission factor of 1.86 lbs VOC per ton of asphalt blowing coating produced, which is used by the asphalt manufacturing industry, was obtained from the USEPA FIRE database.
3. Assumes continuous operation (i.e., 8,760 hr/yr).

Material	Density lb/gal	VOC Content lb/gal	Usage gal/yr	VOC Emissions lb/hr	tpy
Dedusting Agent	8.17	0.0043	714,548	0.35	1.54
Ink-Jet ID	6.81	6.43	3544	2.60	11.39
Solvent	6.66	6.66	28	0.02	0.09
Total				**2.97**	**13.02**

Particulate dust control

Potential particulate matter (PM) emissions from the sizing and packaging area are collected and controlled by cartridge filters. Due to the slight negative on the building, these emissions, which are vented indoors, will be routed to the forming section and, ultimately the forming and collection stack (EP23). As such, the emissions will be further controlled by the fiber collection chamber. The additional control is estimated at 50%. The sizing and packaging areas consist of trimming, baggers, packaging equipment, choppers and dicers.

Emissions are calculated using the estimated air flow through the control devices and a grain loading of 0.005 gr/dscf

Air flow rate
New: 30000 acfm

Control efficiency due to fiber collection chamber: 50%

Sample Calculation: PM = Total Air Flow (cfm) x grain loading (gr/cf) x 60 min/hr x 1lb/7000 gr * (1 - Control efficiency)

Pollutant	lb/hr	tpy
Particulate Matter (PM)	0.64	2.82

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Table 8. Line 2 Future GHG Emissions Summary

Pollutant	Emission Factor (lb/MMBtu)
CO_2	116.98
CH_4	2.20E-03
N_2O	2.20E-04

1. 40 CFR 98 Subpart C, Table 1-A and 1-B

Emission Source	Total Heat Input Rating (MMBtu/hr)	CO_2		CH_4		N_2O		CO_2e	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Furnace	26.2	3,064.77	13,423.71	5.78E-02	0.25	5.78E-03	0.03	3,067.94	13,437.57
Forming	20.0	2,339.52	10,247.10	4.41E-02	0.19	4.41E-03	0.02	2,341.94	10,257.69
Oven	25.2	2,947.80	12,911.35	5.56E-02	0.24	5.56E-03	0.02	2,950.84	12,924.69
Materials Usage	-	684.40	2,997.67				0.00	684.40	2,997.67
Total		**9,036.49**	**39,579.83**	**0.16**	**0.69**	**0.02**	**0.07**	**9,045.12**	**39,617.61**

Global Warming Potential (Table A-1 from 40 CFR 98 Subpart A)

N_2O	298
CH_4	25

GHG Emission Rates from Raw Material Processing

Raw Material Inputs				
Throughput	15,333	lbs/hr		
	67,160	tpy		
Limestone	5	lbs CO_2/ton melted[1]		
	0.036	Fraction of total throughput that is limestone[2]		
Soda Ash	830	lbs CO_2/ton melted[1]		
	0.107	Fraction of total throughput that is soda ash[2]		

[1] Emission factors supplied by raw materials supplier to Guardian as per 40 CFR 98 Subpart N.

[2] Estimated composition of batch.

Melting Raw Materials	Raw Material (tons)	Potential CO_2 Emissions (lbs/hr)	(tpy)
Limestone	2,443	1.39	6.1
Soda Ash	7,209	683.00	2,991.6

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Table 9. Estimation of Emissions from Roadways

Paved Roads

AP-42 13.2.1.3
E= [k(sL)^0.91 x (W)^1.02] x (1-P/4N)

			Reference	
k (PM)	0.011	lb/VMT	Table 13.2-1.1	
k (PM10)	0.0022	lb/VMT	Table 13.2-1.1	
k (PM2.5)	0.00054	lb/VMT	Table 13.2-1.1	
P	140	days	Figure 13.2.1-2	
sL	7.4	g/m2	Table 13.2-1.3	Municipal Solid Waste Landfill
W	40,000	lbs		
W	20.00	tons		
N	365	days/yr		
E (PM)	1.31	lb/VMT		
E (PM10)	0.26	lb/VMT		
E (PM2.5)	0.06	lb/VMT		
VMT	2,400	ft/trip		
	11	trucks/day		
	1,825	miles/yr		

	Emissions		
Pollutant	**lb/hr[1]**	**lb/yr**	**tpy**
PM	0.82	2,381.93	1.19
PM_{10}	0.16	476.39	0.24
$PM_{2.5}$	0.04	116.93	0.06

1. Assumes 8 hr/day, 7 days a week

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Table 9. Estimation of Emissions from Roadways

Unpaved Roads

AP-42 13.2.2
E= [k(s/12)^a x (W/3)^b] x [(365-P)/365]

			Reference	
k (PM)	4.9	lb/VMT	Table 13.2.2-2	
k (PM10)	1.5	lb/VMT	Table 13.2.2-2	
k (PM2.5)	0.15	lb/VMT	Table 13.2.2-2	
P	140	days	Figure 13.2.2-2	
s	6.4	%	Table 13.2.2-1	Municipal Solid Waste Landfill
W	40,000	lbs		
W	20.00	tons		
a (PM)	0.70	lb/VMT	Table 13.2.2-2	
a (PM10)	0.90	lb/VMT	Table 13.2.2-2	
a (PM2.5)	0.90	lb/VMT	Table 13.2.2-2	
b (PM)	0.45	lb/VMT	Table 13.2.2-2	
b (PM10)	0.45	lb/VMT	Table 13.2.2-2	
b (PM2.5)	0.45	lb/VMT	Table 13.2.2-2	
VMT	1,200	ft/trip		
	11	trucks/day		
	913	miles/yr		

	Emissions		
Pollutant	**lb/hr[1]**	**lb/yr**	**tpy**
PM	1.43	4,168.47	2.08
PM_{10}	0.39	1,125.31	0.56
$PM_{2.5}$	0.04	112.53	0.06

1. Assumes 8 hr/day, 7 days a week

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Table 10. New Diesel-Fired Emergency Generator Emission Calculations (Proposed Emission Point EP26)

Engine Model:	Caterpillar C18		
Operational hours:	500	hr/yr	
Engine Size (100% load):	900	bhp	
Engine Size (75% load):	674	bhp	
Engine Size (50% load):	454	bhp	
Fuel Consumption (100% load):	42.7	gal/hr	
Engine Heat Input:	5.85	MMBtu/hr	(based on 137,000 Btu/gal from AP-42 Appendix A)

			Emissions		
Criteria Pollutant Emissions	**Emission Factor**	**Units**	**lb/hr**	**tpy**	**Reference**
NO_X	6.21	g/bhp-hr	12.32	3.08	Vendor performance data at 100% load
CO	0.87	g/bhp-hr	1.73	0.43	Vendor performance data at 100% load
Filterable PM	0.12	g/bhp-hr	0.18	0.04	Vendor performance data at 75% load
PM_{10}	0.12	g/bhp-hr	0.18	0.04	Vendor performance data at 75% load
$PM_{2.5}$	0.12	g/bhp-hr	0.18	0.04	Vendor performance data at 75% load
VOC	0.14	g/bhp-hr	0.14	0.04	Vendor performance data at 50% load (total HC)
SO_2	4.05E-04	lb/bhp-hr	0.36	0.09	EPA AP-42 Table 3.4-1

Sulfur content of diesel oil: 0.05 % (500 ppm S consistent with NSPS IIII diesel fuel requirements)

			Emissions		
Greenhouse Gas Emissions	**Emission Factor**	**Units**	**lb/hr**	**tpy**	**Reference**
CO2	930.34	lb/hr	930.34	232.59	Vendor performance data at 100% load
CH_4	6.61E-03	lb/MMBtu	0.04	0.01	40 CFR 98, Subpart C
N_2O	1.32E-03	lb/MMBtu	0.01	0.00	40 CFR 98, Subpart C
CO_2e			933.61	233.40	

			Emissions		
HAP Emissions	**Emission Factor**	**Units**	**lb/hr**	**tpy**	**Reference**
Benzene	7.76E-04	lb/MMBtu	4.54E-03	1.13E-03	AP-42, Table 3.4-3 (10/96)
Toluene	2.81E-04	lb/MMBtu	1.64E-03	4.11E-04	AP-42, Table 3.4-3 (10/96)
Xylenes	1.93E-04	lb/MMBtu	1.13E-03	2.82E-04	AP-42, Table 3.4-3 (10/96)
Formaldehyde	7.89E-05	lb/MMBtu	4.62E-04	1.15E-04	AP-42, Table 3.4-3 (10/96)
Acetaldehyde	2.52E-05	lb/MMBtu	1.47E-04	3.69E-05	AP-42, Table 3.4-3 (10/96)
Acrolein	7.88E-06	lb/MMBtu	4.61E-05	1.15E-05	AP-42, Table 3.4-3 (10/96)
Naphthalene	1.30E-04	lb/MMBtu	7.60E-04	1.90E-04	AP-42, Table 3.4-4 (10/96)
Total HAP			0.01	0.002	

Engine Load Calculations:

Criteria Pollutant Emission Factors	**Emission Factor for Given % Load (g/hp-hr)**				
	100	**75**	**50**	**25**	**10**
NO_X	6.21	3.64	3.02	7.41	10.21
CO	0.87	0.86	0.47	0.93	3.15
Filterable PM	0.07	0.12	0.1	0.08	0.15
PM_{10}	0.07	0.12	0.1	0.08	0.15
$PM_{2.5}$	0.07	0.12	0.1	0.08	0.15
VOC (Total HC)	0.02	0.04	0.14	0.15	0.32

	Emissions (lb/hr) at Given % Load				
Criteria Pollutant Emissions	**100**	**75**	**50**	**25**	**10**
NO_X	*12.32*	5.41	3.02	3.68	2.03
CO	*1.73*	1.28	0.47	0.46	0.63
Filterable PM	0.14	*0.18*	0.10	0.04	0.03
PM_{10}	0.14	*0.18*	0.10	0.04	0.03
$PM_{2.5}$	0.14	*0.18*	0.10	0.04	0.03
VOC (Total HC)	0.04	0.06	*0.14*	0.07	0.06

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Table 11. New Cooling Tower Emissions

Cooling Tower Reference Data

Unit	Water Circulation Rate gal/min	Water Circulation Rate lb/hr	Annual Operating Hrs	Drift [1] (%)	TDS [2] (ppmw)	TDS Specific Gravity [3]
Cooling Tower 3 (New)	2,412	1,206,965	8,760	0.005%	750	2.2
Cooling Tower 4 (New)	2,412	1,206,965	8,760	0.005%	750	2.2
Cooling Tower 5 (New)	2,412	1,206,965	8,760	0.005%	750	2.2

[1] Drift rate assumed based on industry standard.

[2] Total dissolved solids (TDS) assumed based on public water standard for West Virginia.

[3] TDS specific gravity corresponding to NaCl.

Calculations

Cooling Tower Particulate Emissions Size Distribution
(based on paper by Reisman and Frisbie, "Calculating Realistic PM10 Emissions from Cooling Tower")

Volume of drift droplet = $(4/3)\pi(D_d/2)^3$ [Eq. 1]

Mass of solids in drift droplet = $(TDS)(\rho_w)$(Volume of drift droplet) [Eq. 2]

Solid particle volume = (Particle mass of solids) / (ρ_{TDS}) [Eq. 3]

$D_p = D_d\,[(TDS)(\rho_w/\rho_{TDS})]^{1/3}$ [Eq. 4]

where:

D_p = diameter of solid particle (µm)
D_d = diameter of drift droplet (µm)
TDS = total dissolved solids content (ppmw)
ρ_w = density of water = 1E-6 µg/µm^3
ρ_{TDS} = density of solid particles (assume NaCl)

Size Distribution for Cooling Tower Particulate Emissions

EPRI Droplet Diameter [4] (µm)	Droplet Volume [5] (µm^3)	Particle Mass (Solids) [6] (µg)	Solid Particle Volume [7] (µm^3)	Solid Particle Diameter [8] (µm)	EPRI % Mass Smaller [4]
10	524	3.93.E-07	0.18	0.70	0.00
20	4189	3.14.E-06	1.43	1.40	0.20
30	14137	1.06.E-05	4.8	2.10	0.23
40	33510	2.51.E-05	11.4	2.79	0.51
50	65450	4.91.E-05	22	3.49	1.82
60	113097	8.48.E-05	39	4.19	5.70
70	179594	1.35.E-04	61	4.89	21.35
90	381704	2.86.E-04	130	6.3	49.81
110	696910	5.23.E-04	238	7.7	70.51
130	1150347	8.63.E-04	392	9.1	82.02
150	1767146	1.33.E-03	602	10.5	88.01
180	3053628	2.29.E-03	1,041	12.6	91.03
210	4849048	3.64.E-03	1,653	14.7	92.47
240	7238229	5.43.E-03	2,468	16.8	94.09
270	10305995	7.73.E-03	3,513	18.9	94.69
300	14137167	1.06.E-02	4,819	21.0	96.29
350	22449298	1.68.E-02	7,653	24.5	97.01
400	33510322	2.51.E-02	11,424	27.9	98.34
450	47712938	3.58.E-02	16,266	31.4	99.07
500	65449847	4.91.E-02	22,312	34.9	99.07
600	113097336	8.48.E-02	38,556	41.9	100.00

[4] Based on particle size distrubution test data in Reisman, J. and Frisbie, G., "Calculating Realistic PM10 Emissions from Cooling Towers".

[5] Calculated using Equation 1.

[6] Calculated using Equation 2.

[7] Calculated using Equation 3.

[8] Calculated using Equation 4.

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Table 11. New Cooling Tower Emissions

PM_{10} and $PM_{2.5}$ Fractions Interpolated from Size Distribution

$PM_{2.5}$ Fraction of Total PM (%)	PM_{10} Fraction of Total PM (%)
0.39	86.0

Particulate Emission Rates

PM Emission Rate (lb/hr) = Water Circulation Rate (lb/hr) x Drift x TDS / 1,000,000
PM_{10} Emission Rate (lb/hr) = PM Emission Rate x PM_{10} Fraction
$PM_{2.5}$ Emission Rate (lb/hr) = PM Emission Rate x $PM_{2.5}$ Fraction
Annual Emission Rates (tons/yr) = Short-term Emission Rates (lbs/hr) x 8,760 hours/year / 2,000 lbs per ton

	PM		PM_{10}		$PM_{2.5}$	
Unit	(lb/hr)	(tpy)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Cooling Tower 3 (New)	0.05	0.20	0.04	0.17	0.0002	0.001
Cooling Tower 4 (New)	0.05	0.20	0.04	0.17	0.0002	0.001
Cooling Tower 5 (New)	0.05	0.20	0.04	0.17	0.0002	0.001
Total (New Towers)	**0.14**	**0.59**	**0.12**	**0.51**	**0.0005**	**0.002**

Knauf Insulation
Line 2 Project

Table 12. Line 2 Baseline Emissions Summary

	NO_X (tpy)		CO (tpy)		VOC (tpy)		SO_2 (tpy)		PM (tpy)		PM_{10} (tpy)		$PM_{2.5}$ (tpy)	
Emission Source	**2007**	**2008**	**2007**	**2008**	**2007**	**2008**	**2007**	**2008**	**2007**	**2008**	**2007**	**2008**	**2007**	**2008**
Raw Materials Handling	--	--	--	--	--	--	--	--	0.57	0.15	0.28	0.08	0.28	0.08
Facing Paper - FP 13	--	--	--	--	0.09	0.03	--	--	0.07	0.02	0.07	0.02	0.07	0.02
Ink Printing- FP14	--	--	--	--	1.28	0.23	--	--	--	--	--	--	--	--
Adhesive VOC- FP15	--	--	--	--	1.23	0.26	--	--	--	--	--	--	--	--
Particulate Dust Control - FP16	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Roads	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Forming & Collecting -EP23	0.71	0.20	67.52	18.63	3.66	1.01	0.01	0.00	22.38	6.18	22.38	6.18	22.38	6.18
Curing & Cooling - EP24	9.92	2.74	2.75	0.76	0.88	0.24	0.00	0.00	2.02	0.56	2.02	0.56	2.02	0.56
Total	10.63	2.93	70.26	19.39	7.14	1.78	0.01	0.00	25.03	6.90	24.75	6.83	24.75	6.83
Average		6.78		44.83		4.46		0.01		15.97		15.79		15.79

1. Values are from annual emission inventories reported to WVDEP. For shared equipment (raw materials handling, facing paper, ink printing, adhesive VOC, and packaging dust control), emissions are calculated from a ratio of Line 1 and Line 2 production.
2. Baseline emissions are based on agency receipt of complete application no later than the end of 2016. Baseline period runs from 2007 through 2016.

Knauf Insulation
Line 2 Project

Table 13. Line 2 Baseline GHG Emissions Summary

Pollutant	Emission Factor (lb/MMBtu)
CO_2	116.98
CH_4	2.20E-03
N_2O	2.20E-04

1. 40 CFR 98 Subpart C, Table 1-A and 1-B

		CO_2 (tpy)		CH_4 (tpy)		N_2O (tpy)		CO_2e (tpy)	
Emission Source	**Heat Input Rating (MMBtu/hr)**	**2007**	**2008**	**2007**	**2008**	**2007**	**2008**	**2007**	**2008**
Forming Line # 2	9.60	3,820	1,054	0.07	0.02	0.01	0.00	3,824	1,055
Oven Line #2	18.00	7,162	1,977	0.13	0.04	0.01	0.00	7,170	1,979
Total								**10,993**	**3,034**

1. Calculations are based on ratio of baseline Line 2 throughput to potential Line 2 throughput during baseline period (8,000 lb/hr).

CO_2 Emissions = Baseline Production (lb/hr) / Potential Production (lb/hr) x Design Heat Input x Emission Factor (lb/MMBtu) x Baseline Hours of Operation

Baseline production (lb/hr)	CY 2007	6,213
	CY 2008	6,588
Baseline production (hr/yr)	CY 2007	8,760
	CY 2008	2,280

Global Warming Potential (Table A-1 from 40 CFR 98 Subpart A)

N_2O	298
CH_4	25

GHG Emission Rates from Raw Material Processing

Raw Material Inputs				
Throughput	27,212	tpy 2007		
	7,510	tpy 2008		
Limestone	5	lbs CO_2/ton melted[1]		
	0.036	Fraction of total throughput that is limestone[2]		
Soda Ash	830	lbs CO_2/ton melted[1]		
	0.107	Fraction of total throughput that is soda ash[2]		

[1] Emission factors supplied by raw materials supplier to Guardian as per 40 CFR 98 Subpart N.

[2] Estimated composition of batch.

Melting Raw Materials	**Raw Material (tons)**		**Baseline CO_2 Emissions (tpy)**	
	2007	**2008**	**2007**	**2008**
Limestone	990	273	2.48	0.7
Soda Ash	2921	806	1,212	334.5

Knauf Insulation
Line 2 Project

Table 14. Line 2 Capable of Accommodated GHG Emissions Summary

Pollutant	Emission Factor (lb/MMBtu)
CO_2	116.98
CH_4	2.20E-03
N_2O	2.20E-04

1. 40 CFR 98 Subpart C, Table 1-A and 1-B

Emission Source	Heat Input Rating (MMBtu/hr)	CO_2 (tpy)	$CH_{4\ (tpy)}$	N_2O (tpy)	CO_2e (tpy)
Forming Line # 2	9.60	4,182	0.08	0.01	4,187
Oven Line #2	18.00	7,842	0.15	0.01	7,850
Total					**12,037**

1. Calculations are based on ratio of Line 2 throughput capable of being accommodated to potential Line 2 throughput during baseline period (8,000 lb/hr).

CO_2 Emissions = COA Production (lb/hr) / Potential Production (lb/hr) x Design Heat Input x Emission Factor (lb/MMBtu) x Hours of Operation

COA production (lb/hr)	6,803	(based on maximum month, March 2008, in baseline)
COA operation (hr/yr)	8,760	

Global Warming Potential (Table A-1 from 40 CFR 98 Subpart A)

N_2O	298
CH_4	25

GHG Emission Rates from Raw Material Processing

Raw Material Inputs				
Throughput	6,803	lbs/hr		
	30,367	tpy		
Limestone	5	lbs CO_2/ton melted[1]		
	0.036	Fraction of total throughput that is limestone[2]		
Soda Ash	830	lbs CO_2/ton melted[1]		
	0.107	Fraction of total throughput that is soda ash[2]		

Melting Raw Materials	Raw Material (tons)	COA CO_2 Emissions (lbs/hr)	COA CO_2 Emissions (tpy)
Limestone	1,105	0.63	2.8
Soda Ash	3,259	308.83	1,352.7

[1] Emission factors supplied by raw materials supplier to Guardian as per 40 CFR 98 Subpart N.

[2] Estimated composition of batch.

Knauf Insulation
Line 2 Project

Table 15. Line 2 Capable of Accommodated Emissions Summary for Forming and Collection

Pollutant	Emission Factor (lb/ton)	COA Emissions (tpy)
PM	1.64	25.0
PM_{10}	1.64	25.0
$PM_{2.5}$	1.64	25.0
SO_2	8.05E-04	0.0
NO_2	5.22E-02	0.8
CO	4.96E+00	75.3
VOC	2.69E-01	4.1

1. Calculations are based on Line 2 throughput capable of being accommodated during baseline period.

CO_2 Emissions = COA Production (tons/month) x Emission Factor (lb/ton) x 12 Months x 1 ton / 2000 lbs

COA Production (tons/month) 2,531 (based on maximum month, March 2008, in baseline)

Table 16. Line 2 Capable of Accommodated Emissions Summary for Curing and Cooling

Pollutant	Emission Factor (lb/ton)	COA Emissions (tpy)
PM	0.15	2.3
PM_{10}	0.15	2.3
$PM_{2.5}$	0.15	2.3
SO_2	7.72E-05	0.0
NO_2	7.29E-01	11.1
CO	2.02E-01	3.1
VOC	6.45E-02	1.0

1. Calculations are based on Line 2 throughput capable of being accommodated during baseline period.

CO_2 Emissions = COA Production (tons/month) x Emission Factor (lb/ton) x 12 Months x 1 ton / 2000 lbs

COA Production (tons/month) 2,531 (based on maximum month, March 2008, in baseline)

Knauf Insulation
Line 2 Project

Table 17. Line 2 Capable of Accommodated Emissions Summary for Raw Material Handling

Source	Emission Factor[1] (lbs/ton of material processed)	
	PM	**PM_{10}**
Unloading and conveying (SCC 3-05-012-21)	3.0	1.5
Storage bins (SCC 3-05-012-22)	0.2	0.1
Mixing and weighing (SCC 3-05-012-23)	0.6	0.3

1. EPA AP-42, Section 11.13, Table 11.13-2 for PM data. PM10 data from EPA WebFIRE database based on SCC code.

The tons of raw material processed is equivalent to 111% of the maximum production capacity specified. This rate is based on the method in 2008 inventory.
The production capacity capable of being accommodated is **30,367** tons per year (tpy) based on the maximum month of production during the baseline period and assuming 12 months of operation.
Therefore, the maximum raw material processed is equal to **7,696** lb/hr and **33,707** tpy.

The particulate matter emissions from raw material handling are controlled with bag filter dust collectors, as well as process enclosures.
The use of process enclosures and bag filter dust collectors were determined to have a minimum overall control device efficiency of **99%**

E_{PM} = (Production Rate, tons per unit time) x (PM Emission Factor) x (1 - 0.99)

Source	Uncontrolled						Controlled					
	PM		**PM_{10}**		**$PM_{2.5}$[1]**		**PM**		**PM_{10}**		**$PM_{2.5}$[1]**	
	lb/hr	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**
Unloading and conveying (SCC 3-05-012-21)	11.54	50.56	5.77	25.28	5.77	25.28	0.12	0.51	0.06	0.25	0.06	0.25
Storage bins (SCC 3-05-012-22)	0.77	3.37	0.38	1.69	0.38	1.69	0.01	0.03	0.00	0.02	0.00	0.02
Mixing and weighing (SCC 3-05-012-23)	2.31	10.11	1.15	5.06	1.15	5.06	0.02	0.10	0.01	0.05	0.01	0.05
Total	14.62	64.04	7.31	32.02	7.31	32.02	0.15	0.64	0.07	0.32	0.07	0.32

1. Assumes all PM_{10} is $PM_{2.5}$

Knauf Insulation
Line 2 Project

Table 18. Line 2 Capable of Accommodated Emissions Summary for Facing, Sizing and Packaging

Historical asphalt facing application has been	0.045	ton per ton glass pulled based on recent production history (maximum value from 2004-2013).
The glass pull rate capable of being accommodated is	30,367	tpy
The use of asphalt facing application capable of being accommoda	1,367	tpy of facing material processed.

The emissions from the facing application are uncontrolled and released to the in-plant environment.
Therefore, the estimated PM emissions released to the in-plant environment from the facing was reduced by 90%
Sample Calculation:

E = (Material Rate, tons per unit time) x (Emission Factor) x (1 - PM Control Efficiency, 90)

Pollutant	Factor[1,2] (lbs/ton of material processed)	Emissions lb/hr	Emissions tpy
PM	0.05	0.02	0.08
VOC	1.86	0.29	1.27

1. PM emission factor is lb per ton of wool processed from page C-65 of "Wool Fiberglass Insulation Manufacturing - Background Information for Proposed Standards" USEPA-450-3-82-022a. Assumes all PM is $PM_{2.5}$
2. A representative (conservative) VOC emission factor of 1.86 lbs VOC per ton of asphalt blowing coating produced, which is used by the asphalt manufacturing industry, was obtained from the USEPA FIRE database

Material	Density lb/gal	VOC Content lb/gal	Usage gal/yr	VOC Emissions lb/hr	VOC Emissions tpy
Dedusting Agent	8.17	0.0043	164,053	0.08	0.35
Ink-Jet ID	6.81	6.43	1808	1.33	5.81
Solvent	6.66	6.66	15	0.01	0.05
Laminating Adhesive	9.9	7.74	108	0.10	0.42
Total				**1.51**	**6.63**

Particulate dust control

Potential particulate matter (PM) emissions from the sizing and packaging area are collected and controlled by cartridge filters and exhausted, as fugitive point FP15, to the in-plant environment. The sizing and packaging areas consist of trimming, baggers, packaging equipment, choppers and dicers. Since there will be two (2) new 15,000 acfm cyclones with cartridge bins replacing the existing collection, no emissions are capable of being accommodated.

Line 2 - EP23 (Melting, Forming and Collection)
SCR (Fuel Costs Only)

Standard temperature	68	F
Density of air	0.0026	lb-mole/scf
Specific heat of air	6.85	Btu/lb-mole F
Exhaust gas temperature	140	F
Mimimum temp. for SCR reaction	700	F
Heat input required	8.78	Btu/acf
Exhaust gas flow rate	288100	acfm
Natural Gas Heating Value	1030000	Btu/Mcf
Natural Gas Required	1,290,316	Mcf/yr
Unit natural gas cost	$3.91	/Mcf
Natural Gas Cost	$5,045,135	/yr
Tons of NOx (PTE)	93.73	tons/yr
Control Efficiency (%)	90%	
Tons of NOx removed assuming 80% removal	84	tons/yr
$/ton of NOx removed	$59,807	/ton

Economic Analysis for PM Control via Wet Electrostatic Precipitators- WESP

Annual Cost Summary			**Annual Cost[1,2]**
Wet Electrostatic Precipitator (WESP)			
Line 2 Forming and Collection Air Flow rate	250000	acfm	
ESP Plate Collector Area (A)	100,000	ft^2	
Utility Parameters			
Annual Operating time	8,760	hr/yr	
Electricity			
Fan Power Requirement (FP)	792780	KWh/yr	
System Pressure drop (dP)	2	inches of water	
Pump Power Requirement (PP)	31735	KWh/yr	
Water flow rate (Q)	1250	gal/min	
Fluid head -Z	10.00	(ft)	
Specific gravity of water being pumped compared to water at 70°F and 29.92 in. Hg	1.00	S_g	
Pump Motor Efficiency (η)	0.65		
Electric Costs[3]	0.07	$/KWh	
Waster Water Treament			
Annual Water Usage	10,500	1000 gal/yr	
Treatment Costs	1.30	$/1000 gal	
Indirect Annual Cost			***$524,132***
Overhead - 60% of sum of operating labor, maintenance labor, & maintenance materials			*$32,094.60*
Capital Recovery Cost (CRCs) = TCI X CRF			*$368,132*
Administrative Charges - 2% of TCI			*$78,000*
Property Tax - 1% of TCI			*$39,000*
Insurance - 1% of TCI			*$39,000*
Direct Capital Cost - DC			
Total Direct Cost			$2,575,000
Indirect Costs (installation) -DC			
Total Indirect Installation Costs			$1,325,000
Total Capital Investment (TCI = DC +IC)			**$3,900,000**
Interest Rate			7%
Equipment Life (years)			20
Capital Recovery Factor (CRF)			0.0944
Direct Annual Cost			**$232,712**
Operating Labor - 3 hr/day X 365 X $12/hr			*$13,140*
Operator - 15% of Operator			*$1,971*
Coordinator - 1/3 of operator			$4,380
Maintenance			
Labor $4,125 if (A) < 50,000 ft^2			*$0*
Labor 0.0825A If (A) > 50,000 ft^2			*$8,250*
Materials - 1% of purchase equipment Cost			*$25,750*
Utilities			
Electricity Fan Power Requirement (KWh/yr) X Electrical Costs ($/KWh)			*$52,006*
Electricity Pump Power Requirement (KWh/yr) X Electrical Costs ($/KWh)			*$2,082*
Electricity Operating Costs (KWh/yr) X Electrical Costs ($/KWh)			*$111,483*
Annual Wastewater Treatment Costs			$13,650
Cost Effectiveness Summary			
Annual Control Cost			**$756,845 $/yr**
Forming and Collection Emission Factor	3.21	lb/ton (proposed limit)	
Production Rate	13,333	lb/hr (proposed production rate)	
Uncontrolled Emissions	93.73	tpy	
Control Efficiency	50	%	
Emission Reduction	46.87	tpy	
Cost per ton of Pollutant Removed			**$16,149 $/ton**

1 Annual costs assume 365 days of operation per year.

2 Indirect annual costs from EPA Air Pollution Control Cost Manual - Sixth Edition (EPA 452/B-02-001) Section 6 Chapter 3. http://www.epa.gov/ttn/catc/dir1/cs6ch3.pdf

3 Current electrical costs for industrial facilities in West Virginia (August 2014). http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_6_a

ATTACHMENT O

Monitoring/Recordkeeping/Reporting/Testing Plans

ATTACHMENT O - MONITORING, RECORDING, REPORTING, AND TESTING PLANS

Knauf has identified the proposed monitoring, recordkeeping and reporting in both the application report and Attachment D.

ATTACHMENT P

Legal Advertisement

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that Knauf Insulation, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Prevention of Significant Deterioration (major modification) permit to update the existing R-14 permit (R14-0015L) to modify the existing wool fiberglass insulation operations located off Tabler Station Road in Inwood, Berkeley County, West Virginia. The site latitude and longitude coordinates are: 39.40279 °N, 78.02167° W.

Knauf is planning to modify an existing production line, which requires upgrading existing equipment and installing new equipment. Specifically, the modifications will include the installation of a new melting furnace and upgrades and modifications to the forehearth, collection, curing and packaging operations. The project also involves installation of ancillary equipment related to the production line.

The applicant estimates the potential increase in the following Regulated Air Pollutants associated with the project after the installation of the proposed equipment:

Pollutant	Emissions in tpy (tons per year)
NO_X	102.2
CO	48.2
VOC	33.7
SO_2	24.4
PM	87.6
PM_{10}	110.2
$PM_{2.5}$	109.0
Ammonia	126.18
Total HAPs	< 0.01
Carbon Dioxide Equivalents (CO_2e)	26,459

Start of project will begin as soon as possible. Anticipated start-up is September 2017. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.

Dated this the 1st day of November, 2016.

By: Knauf Insulation, LLC
Iain James
VP Manufacturing
4812 Tabler Station Road
Inwood, WV 25428

ATTACHMENT S

Title V Revision Information

Attachment S

Title V Permit Revision Information

1. New Applicable Requirements Summary

Mark all applicable requirements associated with the changes involved with this permit revision:

☐ SIP	☐ FIP
☐ Minor source NSR (45CSR13)	☒ PSD (45CSR14)
☐ NESHAP (45CSR15)	☐ Nonattainment NSR (45CSR19)
☒ Section 111 NSPS (Subpart(s) CC, PPP, IIII)	☒ Section 112(d) MACT standards (Subpart(s) ZZZZ)
☐ Section 112(g) Case-by-case MACT	☐ 112(r) RMP
☐ Section 112(i) Early reduction of HAP	☐ Consumer/commercial prod. reqts., section 183(e)
☐ Section 129 Standards/Reqts.	☐ Stratospheric ozone (Title VI)
☐ Tank vessel reqt., section 183(f)	☐ Emissions cap 45CSR§30-2.6.1
☐ NAAQS, increments or visibility (temp. sources)	☐ 45CSR27 State enforceable only rule
☐ 45CSR4 State enforceable only rule	☐ Acid Rain (Title IV, 45CSR33)
☐ Emissions Trading and Banking (45CSR28)	☐ Compliance Assurance Monitoring (40CFR64) (1)
☐ NO_x Budget Trading Program Non-EGUs (45CSR1)	☐ NO_x Budget Trading Program EGUs (45CSR26)

(1) If this box is checked, please include **Compliance Assurance Monitoring (CAM) Form(s)** for each Pollutants Specific Emission Unit (PSEU) (See Attachment H to Title V Application). If this box is not checked, please explain why **Compliance Assurance Monitoring** is not applicable:

There are no large pollutant specific emission units. Therefore, CAM is not required at this time.

2. Non Applicability Determinations

List all requirements, which the source has determined not applicable to this permit revision and for which a permit shield is requested. The listing shall also include the rule citation and a rationale for the determination.

40 CFR 63 Subpart NNN is no longer applicable when using non-phenol formaldehyde resin.

☐ **Permit Shield Requested** *(not applicable to Minor Modifications)*

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

3. Suggested Title V Draft Permit Language

Are there any changes involved with this Title V Permit revision outside of the scope of the NSR Permit revision? ☐ Yes ☒ No If Yes, describe the changes below.

Also, please provide **Suggested Title V Draft Permit language** for the proposed Title V Permit revision (including all applicable requirements associated with the permit revision and any associated monitoring /recordkeeping/ reporting requirements), OR attach a marked up pages of current Title V Permit. Please include appropriate citations (Permit or Consent Order number, condition number and/or rule citation (e.g. 45CSR§7-4.1)) for those requirements being added / revised.

4. Active NSR Permits/Permit Determinations/Consent Orders Associated With This Permit Revision

Permit or Consent Order Number	Date of Issuance	Permit/Consent Order Condition Number
R14-0015L	07/21/2015	
	/ /	
	/ /	

5. Inactive NSR Permits/Obsolete Permit or Consent Orders Conditions Associated With This Revision

Permit or Consent Order Number	Date of Issuance	Permit/Consent Order Condition Number
NA		
	/ /	
	/ /	

6. Change in Potential Emissions

Pollutant	Change in Potential Emissions (+ or -), TPY
See Attachment N	

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

7. Certification For Use Of Minor Modification Procedures *(Required Only for Minor Modification Requests)*

Note:	*This certification must be signed by a responsible official. Applications without a signed certification will be returned as incomplete. The criteria for allowing the use of Minor Modification Procedures are as follows:*

i. Proposed changes do not violate any applicable requirement;

ii. Proposed changes do not involve significant changes to existing monitoring, reporting, or recordkeeping requirements in the permit;

iii. Proposed changes do not require or change a case-by-case determination of an emission limitation or other standard, or a source-specific determination for temporary sources of ambient air quality impacts, or a visibility increment analysis;

iv. Proposed changes do not seek to establish or change a permit term or condition for which there is no underlying applicable requirement and which permit or condition has been used to avoid an applicable requirement to which the source would otherwise be subject (synthetic minor). Such terms and conditions include, but are not limited to a federally enforceable emissions cap used to avoid classification as a modification under any provision of Title I or any alternative emissions limit approved pursuant to regulations promulgated under § 112(j)(5) of the Clean Air Act;

v. Proposed changes do not involve preconstruction review under Title I of the Clean Air Act or 45CSR14 and 45CSR19;

vi. Proposed changes are not required under any rule of the Director to be processed as a significant modification;

Notwithstanding subparagraph 45CSR§30-6.5.a.1.A. (items i through vi above), minor permit modification procedures may be used for permit modifications involving the use of economic incentives, marketable permits, emissions trading, and other similar approaches, to the extent that such minor permit modification procedures are explicitly provided for in rules of the Director which are approved by the U.S. EPA as a part of the State Implementation Plan under the Clean Air Act, or which may be otherwise provided for in the Title V operating permit issued under 45CSR30.

Pursuant to 45CSR§30-6.5.a.2.C., the proposed modification contained herein meets the criteria for use of Minor permit modification procedures as set forth in Section 45CSR§30-6.5.a.1.A. The use of Minor permit modification procedures are hereby requested for processing of this application.

(Signed):	_____ *(Please use blue ink)*	Date:	____ / ____ / ____ *(Please use blue ink)*
Named (typed):		Title:	

Note: Please check if the following included (if applicable):

☐	Compliance Assurance Monitoring Form(s)
☐	Suggested Title V Draft Permit Language

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

4. R14 APPLICATION FORMS

The WVDEP permit application forms contained in this application include all applicable R14 application forms including the required attachments.

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.dep.wv.gov/daq

APPLICATION FOR NSR PERMIT AND TITLE V PERMIT REVISION (OPTIONAL)

PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN):

☐ **CONSTRUCTION** ☒ **MODIFICATION** ☐ **RELOCATION**
☐ **CLASS I ADMINISTRATIVE UPDATE** ☐ **TEMPORARY**
☐ **CLASS II ADMINISTRATIVE UPDATE** ☐ **AFTER-THE-FACT**

PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY):

☐ **ADMINISTRATIVE AMENDMENT** ☐ **MINOR MODIFICATION**
☒ **SIGNIFICANT MODIFICATION**

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS **ATTACHMENT S** TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant *(as registered with the WV Secretary of State's Office):*
Knauf Insulation, LLC

2. Federal Employer ID No. ***(FEIN):***
35-1417383

3. Name of facility *(if different from above):*
Inwood Facility

4. The applicant is the:
☐ **OWNER** ☐ **OPERATOR** ☒ **BOTH**

5A. Applicant's mailing address:
4812 Tabler Station Road
Inwood, WV 25428

5B. Facility's present physical address:
4812 Tabler Station Road
Inwood, WV 25428

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☒ **YES** ☐ **NO**
- If **YES,** provide a copy of the **Certificate of Incorporation/Organization/Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A.**
- If **NO,** provide a copy of the **Certificate of Authority/Authority of L.L.C./Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A.**

7. If applicant is a subsidiary corporation, please provide the name of parent corporation: NA

8. Does the applicant own, lease, have an option to buy or otherwise have control of the *proposed site?* ☒ **YES** ☐ **NO**
- If **YES,** please explain: Owned
- If **NO,** you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.): Wool fiberglass manufacturing facility

10. North American Industry Classification System **(NAICS)** code for the facility:
327993

11A. DAQ Plant ID No. (for existing facilities only):
003 – 00012

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):
R30-00300012-2013; R14-0015L

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

12A.

- For **Modifications, Administrative Updates** or **Temporary permits** at an existing facility, please provide directions to the *present location* of the facility from the nearest state road;
- For **Construction** or **Relocation permits,** please provide directions to the *proposed new site location* from the nearest state road. Include a **MAP** as **Attachment B**.

¼ mile east of Tabler Station Road off I-81.

12.B. New site address (if applicable):	12C. Nearest city or town:	12D. County:
NA	Inwood	Berkeley
12.E. UTM Northing (KM): 4,365.50	12F. UTM Easting (KM): 756.55	12G. UTM Zone: 17

13. Briefly describe the proposed change(s) at the facility:
Knauf is proposing to upgrade the second fiberglass insulation production line (Line 2). The upgrades to Line 2 include, but are not limited to, installation of a new gas oxygen-fueled (gas-oxy) melting furnace, upgraded canal/channel and forehearth, fiber forming equipment, and packaging equipment. The project also involves modification of the existing curing oven and glass raw material handling and storage facilities.

14A. Provide the date of anticipated installation or change: As soon as possible – If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: / /	14B. Date of anticipated Start-Up if a permit is granted: September 2017

14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:
Hours Per Day 24 Days Per Week 7 Weeks Per Year 52

16. Is demolition or physical renovation at an existing facility involved? ☒ **YES** ☐ **NO**

17. **Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18. **Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process *(if known).* A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance *(if known).* Provide this information as **Attachment D.**

Section II. Additional attachments and supporting documents.

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate **application fee** (per 45CSR22 and 45CSR13).

20. Include a **Table of Contents** as the first page of your application package.

21. Provide a **Plot Plan,** e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to ***Plot Plan Guidance***) .
– Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F.**

23. Provide a **Process Description** as **Attachment G.**
– Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H.**

– For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I.**

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J.**

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K.**

28. Check all applicable **Emissions Unit Data Sheets** listed below:

☐ Bulk Liquid Transfer Operations	☒ Haul Road Emissions	☐ Quarry
☐ Chemical Processes	☐ Hot Mix Asphalt Plant	☐ Solid Materials Sizing, Handling and Storage Facilities
☐ Concrete Batch Plant	☐ Incinerator	
☐ Grey Iron and Steel Foundry	☐ Indirect Heat Exchanger	☐ Storage Tanks

☒ General Emission Unit, specify Melting Furnace, Forming and Collection, Curing and Cooling, Facing/Sizing/Packaging, New Emergency Generator

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L.**

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

☐ Absorption Systems	☒ Baghouse	☐ Flare
☐ Adsorption Systems	☐ Condenser	☐ Mechanical Collector
☒ Afterburner	☐ Electrostatic Precipitator	☒ Wet Collecting System

☐ Other Collectors, specify

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M.**

30. Provide all **Supporting Emissions Calculations** as **Attachment N,** or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O.**

➢ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and ***Example Legal Advertisement*** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33. **Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

☐ **YES** ☒ **NO**

➢ If **YES,** identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's ***"Precautionary Notice – Claims of Confidentiality"*** guidance found in the ***General Instructions*** as **Attachment Q.**

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below:

☐ Authority of Corporation or Other Business Entity	☐ Authority of Partnership
☐ Authority of Governmental Agency	☐ Authority of Limited Partnership

Submit completed and signed **Authority Form** as **Attachment R.**

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned ☒ **Responsible Official** / ☐ **Authorized Representative,** hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE _____ (Please use blue ink) DATE: 11/1/16 (Please use blue ink)

35B. Printed name of signee: Iain James		35C. Title: VP Manufacturing
35D. E-mail: Iain.james@knaufinsulation.com	36E. Phone: 317-421-8758	36F. FAX: N/A
36A. Printed name of contact person (if different from above): Chris Mahin		36B. Title: Regional HSE Manager
36C. E-mail: chris.mahin@knaufinsulation.com	36D. Phone: 317-421-8561	36E. FAX:

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

☒ **Attachment A: Business Certificate**
☒ **Attachment B: Map(s)**
☒ **Attachment C: Installation and Start Up Schedule**
☒ **Attachment D: Regulatory Discussion**
☒ **Attachment E: Plot Plan**
☒ **Attachment F: Detailed Process Flow Diagram(s)**
☒ **Attachment G: Process Description**
☐ **Attachment H: Material Safety Data Sheets (MSDS)**
☒ **Attachment I: Emission Units Table**
☒ **Attachment J: Emission Points Data Summary Sheet**
☒ **Attachment K: Fugitive Emissions Data Summary Sheet**
☒ **Attachment L: Emissions Unit Data Sheet(s)**
☒ **Attachment M: Air Pollution Control Device Sheet(s)**
☒ **Attachment N: Supporting Emissions Calculations**
☒ **Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans**
☒ **Attachment P: Public Notice**
☐ **Attachment Q: Business Confidential Claims**
☐ **Attachment R: Authority Forms**
☒ **Attachment S: Title V Permit Revision Information**
☒ **Application Fee**

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

☐ ***Forward 1 copy of the application to the Title V Permitting Group and:***
☐ ***For Title V Administrative Amendments:***
  ☐ ***NSR permit writer should notify Title V permit writer of draft permit,***
☐ ***For Title V Minor Modifications:***
  ☐ ***Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,***
  ☐ ***NSR permit writer should notify Title V permit writer of draft permit.***
☐ ***For Title V Significant Modifications processed in parallel with NSR Permit revision:***
  ☐ ***NSR permit writer should notify a Title V permit writer of draft permit,***
  ☐ ***Public notice should reference both 45CSR13 and Title V permits,***
  ☐ ***EPA has 45 day review period of a draft permit.***

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

ATTACHMENT A

Current Business Certificate