Jefferson County Foundation, Inc.

July 29, 2020

Via email

Laura Crowder, Director
Division of Air Quality
West Virginia Department of Environmental Protection
601 51th St. SE
Charleston, WV 25304
laura.m.crowder@wv.gov

RE: Rockwool Mineral Wool Production Facility – Ranson, West Virginia Facility ID: 037-00180 – Permit No: R14-0037

Dear Director Crowder:

It has recently come to the attention of the Jefferson County Foundation that, in a letter dated March 2, 2020, Rockwool notified the West Virginia Department of Environmental Protection Division of Air Quality (DEP DAQ or DEP or the agency) that Rockwool plans to operate the Melting Furnace on its Ranson site using only natural gas as fuel. Rockwool asserted that this change was allowed under current Permit No. R14-0037. Subsequent to Rockwool's communication to your agency, it appears that this significant modification was treated as a Class I administrative change, and both the notification from Rockwool and the March 11 approval letter from DEP have since been appended to the permit.

While we are encouraged that Rockwool maybe using less coal, this situation creates or highlights three issues that must be addressed by the DEP DAQ urgently.

1. Rockwool and the DEP need to entirely re-do the BACT analysis with natural gas as the sole fuel source for the Melting Furnace.

2. At minimum a Class II administrative change with public notice needs to be made for this modification.

3. The redacted information from the permit application needs to be provided to the public so the public may adequately evaluate the emission limits set by BACT.

These issues need to be immediately addressed by the DEP DAQ.

Additionally, the DEP response to Rockwool's notice of modification was appallingly insufficient and vague. The method in which these documents were made available to the public was insufficient and inappropriate. The DEP needs to request more information from Rockwool about these changes and require Rockwool to address the requirements outlined above. Otherwise, the DEP response perpetuates the lack of transparency and lack of due diligence that has plagued the agency's handling of the Rockwool project from the start.

Enclosed please find additional detail and analysis in support of the Foundation's request for DEP action. We ask that a Class II administrative change with public notice be conducted or Rockwool be required to seek a new permit entirely, that the BACT analysis be redone by both Rockwool and the DEP independently, that EPA be advised of these significant permit changes, and that the process be conducted in an open and transparent way including making all cited redacted material available to the public. These issues must be immediately addressed in a comprehensive and transparent way in order to comply with law and to protect the air quality and health of the residents of Jefferson County and the region. Thank you for your attention to this important matter.

Regards,

Christine L Wimer

Dr. Christine Wimer
President
Jefferson County Foundation

Cc: Scott Mandirola, WVDEP Deputy Secretary for External Affairs
West Virginia Department of Environmental Protection
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Enclosures

Exhibit A Detailed Background and Analysis, Submitted by Jefferson County Foundation, July 29, 2020

Exhibit B – M Other cited exhibits

Exhibit A

Detailed Background and Analysis
Submitted by Jefferson County Foundation
July 29, 2020

In re Rockwool Mineral Wool Production Facility – Ranson, West Virginia
Facility ID: 037-00180 – Permit No: R14-0037

Background:

On April 30, 2018, Rockwool received a final determination and permit to construct from West Virginia Department of Environmental Protection Division of Air Quality (DEP DAQ or DEP or the agency). In a letter dated March 2, 2020, Rockwool notified the DEP DAQ that it plans to operate its Melting Furnace using only natural gas (Exhibit B). The letter was received by the DEP on March 4 and replied by DEP DAQ to on March 11 (Exhibit C). This modification was treated as a Class I administrative change, and both the notification from Rockwool and the DEP have since been appended to the permit.

It is unknown exactly when this document was made publically available on the DEP application extender website. However we know from a screen shot we took on May 20, 2020 that it appears to have been posted after this time (Exhibit D). There is no one location where all materials about an applicant can be accessed by the public on the DEP website. These letters were posted in a location with a small seemingly random collection of communications, only 4 of which have been posted since the final approval of the construction air permit and they are a letter from Ms. Regina Hendrix of Sierra Club from 2018 (Exhibit E), a letter from DEP in response to Ms. Regina Hendrix also from 2018 (Exhibit F), a letter in response to a letter from Commissioner Lorenzetti from 2019 (Exhibit G) and an email from Rockwool about a change of address form from January 2020 (Exhibit H). It is not clear why this recent and important communication was posted here or how the public would have known that this is the location they should have been watching for such information.

Issues to be immediately addressed:

1. *Rockwool and the DEP need to repeat the BACT analysis with natural gas as the sole fuel source for the melting furnace.*

Now that it is obvious that natural gas is viable as a sole fuel source for the Melting Furnace, Rockwool needs to completely re-do the BACT analysis for the Melting Furnace and consider Low-NO_x and Ultra Low-NO_x burners for NO_x BACT, the use of natural gas only for the SO_2 BACT, and the use of natural gas fuel only for the the greenhouse gas (GHG or CO_2e) BACT. This is not simply an academic exercise. If

natural gas only is viable as a sole fuel source for the Melting Furnace, then the BACT and the BACT-revised emission limits must be made federally enforceable by folding them into a revised air permit.

In Rockwool's BACT analysis for CO_2e from the Melting Furnace[1], natural gas as a fuel source instead of coal was specifically excluded, because it was said to be "technically infeasible." (Exhibit I) According to the Rockwool permit application: the use of only natural gas as a fuel would "fundamentally redefine the process of a coal/natural gas/oxy-fired Melting Furnace."[2] Rockwool's stated restriction therefore fundamentally limited the BACT analysis.

Rockwool acknowledged in the CO_2e BACT analysis that, "Natural gas, the fuel that results in the lowest GHG emissions per unit energy output, is the primary fuel used elsewhere in the plant."[3] However, natural gas was removed from consideration as the sole fuel source for the Melting Furnace as technically infeasible and therefore was removed from the BACT analysis as a possible option. Natural gas is obviously now technically feasible and as such Rockwool must be required to repeat the CO_2e BACT analysis and restore consideration of the option of natural gas powering the Melting Furnace as BACT. This represents a fundamental change in the process and technology and should therefore include EPA review.

Clearly Rockwool has admitted they can afford to use natural gas as the sole fuel source in the Melting Furnace and that it is technically feasible to do so. Rockwool should therefore be ***required*** to use ***only*** natural gas as a fuel source as it is the best available technology for containment of CO_2e, and should not be allowed to revert to coal if and when they so choose.

In Rockwool's BACT analysis of NO_x for the Melting Furnace, because coal instead of natural gas was being utilized, Low-NO_x and Ultra Low-NO_x natural gas burners were not considered as a technically feasible option for BACT of NO_x for that emissions source. For all other natural gas ovens, burners, and boilers in the plant the use of Low-NO_x burners was selected as BACT for NO_x control. Now that it is known that natural gas is technically feasible Rockwool should be ***required*** to use Low-NO_x burners in the Melting Furnace as well to further reduce the NO_x emissions from that source.

By having first applied for an air permit and claiming it was technically necessary to operate with coal-burning technology, then at a later date substituting that with

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[1] Prevention of Significant Deterioration, Application For The Construction of a Mineral Wool Manufacturing Facility, Page 546

[2] Prevention of Significant Deterioration, Application For The Construction of a Mineral Wool Manufacturing Facility, Page 551

[3] Prevention of Significant Deterioration, Application For The Construction of a Mineral Wool Manufacturing Facility, Page 552

natural gas-only technology, Rockwool has avoided appropriate BACT analysis. In doing so, Rockwool achieved being permitted for far more emissions than are necessary for their process, and afforded themselves built-in leniency for their emissions. This kind of deception and disregard for our air quality cannot be tolerated. Further, it is clear that one cannot rely on the Title V permit process to provide a backstop protection for these insufficiencies, as Rockwool has been operating in Byhalia for over five years and has yet to obtain a Title V permit.

2. *A Class II administrative change with public notice should be made for this modification.*

In accordance with 45 C.S.R. 13-4(2)(b), this change requires a Class II administrative change with public notice. This regulation requires that a "Change in a permit condition as necessary to allow changes in operating parameters, emission points, control equipment or any other aspect of a source which results in an increase in the emission of any existing regulated air pollutant or any new regulated air pollutant; or" requires a Class II modification. This description is met by this change and therefore a Class II administrative change with public notice should be conducted.

In its March 2, 2020 letter, Rockwool asserts that "Rockwool's air permit authorizes the use of both natural gas and coal-fired burners in the Melt Furnace, identified as emission point ID IMF01." In fact, it does not specifically authorize the use of natural gas in the Melting Furnace. It is not at all clear from the publically facing portion of the permit that natural gas is approved for use in the Melting Furnace and if this is the case in the redacted information cited then omissions were made in the remainder of the document as outlined in the examples below. Therefore, this change represents a change in operating parameters, a modification that at very least requires a Class II administrative change and may very well be a major modification requiring a new application all together. There are several examples that illustrate why this is so.

- In the permit itself, R14-0037, pages 30-33, Section 4.1.4 Melting Furnace, "natural gas" is not once included in this section. In fact, the only information contained in either the permit itself or the permit application about the fuel source of the Melting Furnace, is a narrative, which explains it will burn pulverized coal (Exhibit J).

- In the BACT analysis for CO_2e for the Melting Furnace, natural gas is specifically excluded as technically infeasible for powering the Melting Furnace. In the BACT analysis for NO_x, the use of oxy-fuel burners was included, but the definition and description does not refer to "natural gas," only that "the oxy-fuel burners are specially designed to fire with oxygen

instead of ambient air." Energy efficiency measures given in Table D-9-2 of the permit application has no measure that mentions natural gas (Exhibit K).

- A CO_2e BACT was set for all of the natural gas combustion devices totaled together. The Melting Furnace was EXCLUDED from the list of natural gas combustion emission sources. If the permit authorized its use, then the Melting Furnace should have been considered with these sources. It was not.

- In the emission unit data sheet for the Melting Furnace, required by the permit application, there is no mention of "natural gas." (Exhibit L) However, in the emission unit data sheet for the afterburner, a control device on the curing line, the gas flow rate is specifically reported, as is the type of firing equipment or natural gas burner. If the oxy-fuel burners on the melting furnace were "approved" to burn natural gas, then a similar form should have been filled out for them. It was not.

- The emission factors used to model the Melting Furnace in the Dispersion Model are coal combustion factors (and their associated emissions of particulate matter, NO_x, SO_2, CO, VOCs, and HAPs). They were taken from stack testing of the furnace at the Byhalia plant and "scaled appropriately." The Dispersion Model can only use approved fuels (so it is representative of the actual conditions it is meant to model); it is not clear if the Byhalia facility stack test involved natural gas fuel for the Melt Furnace or coal only. The Emissions Data Sheet for the Melt Furnace, required in support of Rockwool's Ranson air permit leaves those data fields blank.

- If Byhalia is a fundamentally different type of furnace, as we suspect, then it was entirely inappropriate for DEP to accept a stack test-derived emission limit from Byhalia and transfer it to proposed operations in Ranson. If natural gas was "approved for the Melt Furnace," as suggested by Rockwool in their March 2, 2020 letter to DEP, then natural gas emission factors from AP42[4] should have been used, not a stack test from a coal-burning melt furnace in Mississippi.

These examples demonstrate that natural gas was not outright "authorized" as Rockwool claims. Rockwool also claims that: "Neither the permit application nor the permit specifies the amount of each fuel that is to be combusted in the Melt Furnace." Due to the redactions in the publicly available documents, we cannot determine if this statement is true. Also if neither the permit application nor the permit itself specifies the amount of each fuel, how can one be confident in the emission values used to develop the permit, run the dispersion model, do the BACT

[4] AP-42 - EPA Compilation of Air Emission factors and process information standard reference for air permitting since 1972. https://www3.epa.gov/ttn/chief/ap42/ch01/

analysis, and set the emission limits for this source. Once more, the public has been kept in the dark.

Despite the many process-related redactions, however, we know from the unredacted Fire Marshall's variance application (Exhibit M) that the total MegaWatt capacity of the furnace is 29.1 MW or 99.4 MMBtu/hour. The Melting Furnace design has 4 oxy-fuel burners fueled by natural gas and operated with oxygen-enriched air at a capacity up to 6.8 MW (23.2 MMBtu/hour), and 5 coal burners, fueled with coal powder, were approved to supply 22.3 MW (76.2 MMBtu/hour). This means that the Melting Furnace would have drawn 23% of the power from natural gas, and 77% of its power from the coal-burners.

Furthermore, this variance application reveals that the Melting Furnace accounts for 67% of the entire facility's NO_x emissions (163.37 tons per year out of 274.31 tons per year), 100% of the entire facility's SO2 emissions (147.31 tpy out of 147.31 tpy), 100% of the entire facility's acid gas (H2SO4) emissions (16.37 tpy out of 16.37 tpy), 62% of the entire facility's CO_2e (95,547 tpy out of 152,933 tpy), and 23% of the entire facility's PM10 emissions (36.01 tpy out of 155.59 tpy). Therefore, a change in 77% of the fuel source of the largest emission source for a majority of the emission changes the entire permit and is not just simply adjusting percentages as Rockwool tried to pass it off as.

The proposed change is a change in the method of operation of the source such that Carbon Monoxide, a regulated air pollutant, would increase. This is based on review of AP42 emission factors for combustion of natural gas compared to coal. This change will also necessitate a change in BACT and require that the BACT analysis be re-done.

It is clear that natural gas was not approved as the sole fuel source for the Melting Furnace in the original application, and that changing this fundamental process makes a huge change in the expected emissions profile, and will necessitate a BACT change. This represents a change in operating parameters, emission points, control equipment and a change in a source, which results in an increase in the emission. Therefore by definition this change meets the requirement set forth in 45 C.S.R. 13-4(2)(b), and as such this change requires a Class II administrative change and quite possibly a new application entirely. We believe that due to the extensive changes and need for EPA review it would be most appropriate to require an entirely new permit.

3. *Redacted information needs to be provided to the public so the public may adequately evaluate the BACT.*

The Clean Air Act is very clear that emissions data is not subject to Confidential Business Information claims. Section 114(c) of the Federal Clean Air Act, 42 U.S.C. 7414(c), authorizes full disclosure to the public of any information that meets a broad definition of "emissions data." The EPA codified that into regulation at 40 CFR

section 2.301 et seq. Section 2.301(a)(2)(i) includes in that definition not only the amount of actual or permitted emissions, but "information necessary to determine the identity, amount, frequency, concentration or other characteristics (to the extent related to air quality) of the emissions…including to the extent necessary for such purposes a description of the manner or rate of operation of the source." Also, section 503(e) of the Clean Air Act specifically prohibits Title V Permits from containing confidential information and CBI. According to WV state regulations information concerning the "types and amounts of air pollutants discharged," as that term is defined in WVCSR §45-31-2.4, shall not be claimed as confidential in New Source Review Prevention of Significant Deterioration and Title V permits. .

Therefore, in the April 28, 2018, final air construction permit there should not be any actual redacted information. However, in this case the permit does not contain detailed process and emissions unit characteristics or expected emissions, and simply refers to the Prevention of Significant Deterioration pre-construction permit application as the source of such information. It is there that we see large swaths of white space and empty forms, blanked out emission numbers, even permitted emission numbers. This clearly evades the intent of the Clean Air Act and federal regulations.

In light of the WV Fire Marshall's variance application—now easily found on a Google search—the supposed protections given to Rockwool for CBI must be removed. Such information is now in the public realm and cannot continue to be protected. And it shouldn't have been in the first place.

Full disclosure of Melting Furnace fuels, processes, and emissions with natural gas the fuel needs to be supplied immediately to the public so they can properly evaluate the implications for both the dispersion modeling and the BACT. It is unacceptable for the public not to have this necessary information.

Lack of due diligence and transparency

Throughout the process of Rockwool's construction and operational permitting, the DEP has failed to conduct appropriate due diligence leaving the air and water resources and by necessity the health and welfare of the people of Jefferson County at risk. Unfortunately, the handling of this seems to be no different.

The DEP response to Rockwool's notice of modification was insufficient. The DEP needs to request more information from Rockwool about these changes. This should include confirming if coal will still be used as a raw material or in-process fuel, and what other changes are being made to the process that allows this accommodation.

The DEP needs to immediately and transparently require a Class II administrative change or an entirely new permit application, require Rockwool to and themselves independently repeat the BACT analysis, and needs to provide the public with all the

redacted information from the PSD that was referred to in the air permit application.

The DEP's response letter seems intentionally vague and invites further non-written communication, which is impossible for the public to obtain. This overtly limits public awareness of the process and implications of such actions. The DEP needs to recognize the public's right to know what its government is doing and what is being emitted into the air, and seek effective transparency accordingly.

We ask that a Class II administrative change with public notice be conducted or Rockwool be required to seek an entirely new air permit, that the BACT analysis be repeated by both Rockwool and the DEP independently, that EPA be advised of these significant permit changes, and that the process be conducted in an open and transparent way including making all cited redacted material available to the public.

Exhibit B

ROCKWOOL

MAR -4 2020

March 2, 2020

Director Laura Crowder
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, West Virginia, 25304

RE: ROCKWOOL Mineral Wool Production Facility – Ranson, West Virginia
Facility ID: 037-00180 – Permit No: R14-0037

Dear Director Crowder:

Roxul USA, Inc. dba ROCKWOOL makes notification to the West Virginia Department of Environmental Protection, Division of Air Quality (WVDAQ) that it plans to operate the Melt Furnace using only natural gas, as allowed under Permit No. R14-0037.

ROCKWOOL's air permit authorizes the use of both natural gas and coal-fired burners in the Melt Furnace, identified as emission point ID IMF01. Neither the permit application nor the permit specifies the amount of each fuel that is to be combusted in the Melt Furnace.

ROCKWOOL has determined that it is technically feasible to conduct Melt Furnace operations entirely on natural gas. The utilization of natural gas as the only fuel input does not impact the heat input capacity, in MMBtu/hour, of the Melt Furnace. In order to fire entirely on natural gas, a minor adjustment in the use of raw materials that are authorized by the permit is required. The adjustment in use of raw materials will result in no change in emissions. The stack parameters used to demonstrate compliance in the air dispersion modeling will not be impacted by the fuel change.

The change to firing only on natural gas will be a reduction in regulated air pollutants, as authorized under Permit No. R14-0037. At this time, ROCKWOOL wishes to retain the sources associated with the use of coal-fired operations, in the event operations require reverting back to coal. After successful startup on natural gas, ROCKWOOL may remove coal sources from the air permit, which will provide a further reduction of regulated emissions.

ROCKWOOL is planning to startup operations entirely on natural gas and makes this notification to WVDAQ to keep the agency informed of expected facility operations.

If you have any questions concerning this letter, please contact me further at ken.cammarato@rockwool.com or at 662-851-4734 if you wish to discuss this matter further.

Sincerely,

Ken Cammarato
Vice President and General Counsel

Part of the ROCKWOOL Group
665 Northport Avenue
Ranson, WV 25430

Exhibit C

west virginia department of environmental protection

Division of Air Quality
601 57th Street, SE
Charleston, WV 25304
(304) 926-0475

Austin Caperton, Cabinet Secretary
dep.wv.gov

March 11, 2020

Mr. Ken Cammarato, Vice President and General Counsel
Roxul USA, Inc. (Roxul)
665 Northport Avenue
Ranson, WV 25430

RE: Roxul USA, Inc.
Ranson Facility
Permit Number: R14-0037
Plant ID Number: 037-00180

Dear Mr. Cammarato:

The Division of Air Quality (DAQ) confirms that on March 4, 2020, we received your letter that provided information on Roxul's plans to operate the Melt Furnace using only natural gas and without the use of coal. Please note that all applicable conditions in the permit remain in effect.

Should you have any questions, please Mr. Joe Kessler at (304) 414-1271.

Sincerely,

Laura M. Crowder

Laura M. Crowder
Director, Division of Air Quality

Exhibit D

10-4-2018 - Google Drive | ApplicationXtender Web Access

https://documents.dep.wv.gov/AppXtender/datasources/DEPAX16/queryResults/{a0261bb4-a

opentext | ApplicationXtender - DEPAX16

DEP

Applications

- DAQ-ASBESTOS
- DMR-MINING
- DMR-NPDES-UIC
- DWWM-HW
- OOG-COALBEDMETHANE
- PERMITS
- **PERMITSAIR**
- PERMITSOOG

Query Results

PERMITSAIR > New Search > Query Results

Text Search

DOCUMENT DATE	RESPONSIBLE PARTY NAME	FACILITY/PROJECT/PAD NAME	DOCUMENT TYPE	PERMIT TYPE
01-22-2020	ROXUL USA INC.	RAN FACILITY	CORRESPONDENCE	COMPLIANCE AND ENFO
09-11-2019	ROXUL USA INC.	RAN FACILITY	CORRESPONDENCE	RULE 14 PERMIT - MAJO
07-20-2018	ROXUL USA INC.	RAN FACILITY	CORRESPONDENCE	COMPLIANCE AND ENFO
07-06-2018	ROXUL USA INC.	RAN FACILITY	CORRESPONDENCE	COMPLIANCE AND ENFO
04-30-2018	ROXUL USA INC.	RAN FACILITY	ENGINEERING EVALUATION/FACT SHEET	RULE 14 PERMIT - MAJO
04-30-2018	ROXUL USA INC.	RAN FACILITY	PERMIT/GENERAL PERMIT REGISTRATION	RULE 14 PERMIT - MAJO
12-21-2017	ROXUL USA INC.	RAN FACILITY	CORRESPONDENCE	RULE 14 PERMIT - MAJO
11-21-2017	ROXUL USA INC.	RAN FACILITY	APPLICATION	RULE 14 PERMIT - MAJO

Documents 1 - 8 of 8

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Exhibit E

SIERRA CLUB
FOUNDED 1892

July 2, 2018

Entire Document
NON-CONFIDENTIAL

Director Fred Durham
Division of Air Quality
West Virginia Dept. of Environmental Protection
601 57th Street SE
Charleston, WV 25304

I.D. No. 037-00108 Reg. R14-0037
Company ROXUL USA, INC.
Facility RAN Region
Initials JM

Dear Director Durham:

On behalf the membership of Sierra Club Eastern Panhandle, thank you for the opportunity to provide feedback on Permit Number: R14-0037 for Roxul/Rockwool Group's planned mineral wool site in Ranson, WV.

Our technical staff have reviewed Rockwool Group's underlying permit application, and I'd like to relay a number of their significant concerns. We are grateful for your consideration of these issues as we work together towards the mutual goal of protecting public health.

The permit application uses 1992 demographic data, which is extremely outdated for Jefferson County, WV. Since 1992, the Jefferson County population has grown more than 50%, and much of that growth is in new residential neighborhoods near the plant site. Rockwool Group's classification of land use in the area around the site as "less than 1% urban" (pages 460-461 of 608) is surely no longer accurate; in fact there are four public schools and two freestanding daycare facilities within two miles of the plant. The close proximity of these schools-- North Jefferson Elementary is just 2,300 feet away-- raises our level of concern about the potential impact of the facility and warrant the state revisiting the permit.

With that in mind, the permit application does not include the results of any air quality modeling. The permit application contains a modeling plan, but does not appear to include the actual results of that proposed air quality modeling. Obviously it is difficult for

the public to understand or provide comments on the environmental impact of the facility without the modeling result.

Further, the air quality modeling plan does not include any potential modeling of the impacts of emissions of hazardous air pollutants such as formaldehyde, methanol, HF, HCl, and phenol. While modeling for criteria pollutant emissions is important and is planned, equally if not more important is an evaluation of the impacts of air toxic emissions on the nearby schools. The state should require that Rockwool Group evaluate the ambient air impacts and the human health risk to the children at the nearby schools from the emissions of HAPs from the facility.

The facility will further use phenol-formaldehyde resins in the manufacturing process. These resins are the matrix within which the mineral wool fibers are embedded during the process of making various products at the facility. As you know, phenol and especially formaldehyde are toxic pollutants. Formaldehyde in particular has been linked to numerous health impacts from cancer to neurological damage. It is critical for the facility model to include the impact of HAP emissions on nearby schools.

Just as important, Rockwool Group's permit application explicitly declines to evaluate a major potential pollution vector: transient operations, maintenance, startup, shutdown, and upsets. From page 439 of 608*: "Transient operations, such as startup and shutdown, related to scheduled maintenance occur once a week. Furthermore, when transient operations do occur, the emission profile of pollutants is only significantly impacted for a short period of time. Given that these events are infrequent in nature, Roxul is not proposing to separately model transient operations."*

We strongly disagree with that position. Given the proximity of the facility to North Jefferson Elementary and three other schools, emissions from transient operations should be evaluated for their potential impact on children's health. In addition, the facility's own modeling plan (page 452 of 608) shows that the facilities emissions result in potential impacts within a fraction of one percent of the level that should result in more in-depth analysis of ambient ozone impacts (99.2% versus 100%). Spikes in emissions of ozone precursors like VOC and NOx during transient operations could elevate the steady state impacts (99.2%) to above the 100% threshold.

Likewise, the impacts of steady state emissions from the facility on visibility at nearby Class I areas (page 470 of 608) are very close to the regulatory Q/d limit (9.6 versus 10) that would require a more rigorous analysis of visibility impacts. Transient emissions could readily push the visibility impacts of the facility above the Q/d = 10 threshold.

Because of the proximity to the schools, as well as ambient ozone impacts, visibility impacts, and potentially others, Rockwool Group should be required by WVDEP to evaluate all air emissions from the facility, including both steady state and transient emissions.

Another issue is Best Available Control Technology (BACT). There are several air streams containing Volatile Organic Compounds (VOCs) and organic HAPs (like formaldehyde) that the facility is proposing to control with an afterburner (page 492 of 608, page 505 of 608). However, there is another technology, Catalytic Combustion, that might be able to achieve higher levels of pollution destruction and reduce emissions more than is possible with an afterburner. Even small increases in control efficiency, for example from 95% to 99%, can result in huge differences in emissions. Stack emissions in lbs/hr or tons/year will decrease by a factor of 5 if the control technology has a 99% control efficiency versus a 95%. Emissions of 100 tpy with a device that controls at 95% would fall to 20 tpy at a 99% control. Likewise, emissions would drop by a factor of 10 with increases in control efficiency from 99% to 99.9%.

Unfortunately, the justification for ruling out catalytic combustion in the BACT analysis is very thin: the possible presence of particulates that could foul the catalyst. While these VOC streams might contain particulates, these particulates can be removed to high efficiency by cleaning them first in devices like the wet electrostatic precipitator or fabric filters planned at the facility.

Rockwool Group should be required to submit a more rigorous BACT analysis for VOC and organic HAP control that includes the potential use of catalytic combustion and removal of particulates, especially with the consideration of the close proximity of the school. Small increases in control efficiency, through the use of catalytic systems, can result in huge drops in actual emissions. (BACT analysis and State Rule 45 CSR 06)

Another area of concern is Rockwool Group's failure to include emission estimates for metallic hazardous air pollutants. The application described how the facility will be using fuel and raw materials like coal, pet coke, anodes, eruptive stones such as basalt/diabase, amphibolite and anorthosite, slags such as blast furnace slag and converter slag, dolomite and/or limestone, mineral additives, such as olivine sand and high alumina content materials such as bauxite, kaoline clay and aludross. These fuels and raw materials are known to contain numerous hazardous air pollutants, such as mercury, arsenic, cadmium, and chromium.

During the heating, combustion, and mechanical manufacturing processes at the facility, large amounts of particulate matter are generated in the form of PM_{10} and $PM_{2.5}$. While

the application includes emission estimates and BACT analysis for PM10 and PM2.5 from the various emission points, the application does not speciate the particulate matter into the numerous metallic HAPs that are constituents of those fuels and raw materials. Therefore, the community has no idea via this application what level of mercury, arsenic, cadmium, chromium, or any other metallic HAP emissions they can expect from this facility.

Likewise, since the particulate matter is not speciated and emissions of the metallic HAPs are not provided, there is no plan in the PSD application to conduct an air quality analysis of the impact of those metallic HAP emissions on the nearby schools. WVDEP should ask Rockwool Group to speciate PM emissions, provide estimates of emissions of metallic HAPs into the community, and evaluate the impact of those emissions on the ambient air and health risk at the nearby schools.

State Rule 5.2 governs odor impacts, but the PSD application fails to evaluate the impact of the facility in terms of odors. Given the emissions of phenol, formaldehyde, and other organics, an odor analysis should be provided. The application does not contain any compliance methods, monitoring methods, controls, odor threshold analyses, air quality modeling, or any other considerations for odor impacts.

We also were unable to fully analyze the Air Pollution Control Device Sheets (Attachment M forms), as they contain numerous blanks of critical information. Rockwool Group actually failed to answer key questions and provide essential information in every Attachment M. The company should be asked to complete a new set of forms with each question answered, so that the public can fully evaluate the proposed facility.

For example, the Selective Non Catalytic Reduction (SNCR) is proposed to help reduce NOx emissions from the melt furnace. Because of all the missing information in the Attachment M forms, it is not clear if the facility is proposing to monitor the outlet concentration of ammonia from SNCR operations. This should be a requirement in the permit if SNCR is used, to help avoid excessive emissions of ammonia into the community.

Finally, as you know, there are real-time and continuous monitors available to measure concentrations of formaldehyde in exhausts, such as the Picarro G2307 Gas Concentration Analyzer. The close proximity of North Jefferson Elementary in particular makes the continuous monitoring of formaldehyde important, so that the facility, regulators, and the public have confidence that emission rates and the performance of control equipment are meeting expectations.

Please let me know if we need to provide further information. We would request a meeting with DEP in order to discuss additional monitoring and pollution controls. Thank you for your consideration of these concerns and we look forward to your response.

Sincerely,

Regina Hendrix

Regina Hendrix
Eastern Panhandle Sierra Club
65 Bradford Court
Charles Town, WV 25414

Telephone: (304) 725-0223
Email: regina.hendrix@comcast.net

Exhibit F

west virginia department of environmental protection

Division of Air Quality
601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0475

Austin Caperton, Cabinet Secretary
dep.wv.gov

July 20, 2018

Ms. Regina Hendrix
Eastern Panhandle Sierra Club
65 Bradford Court
Charles Town, WV 25414

RE: ROXUL USA, Inc.
RAN Facility
Permit No. R14-0037
Plant ID No. 037-00108

Dear Ms. Hendrix:

This letter acknowledges that the WV Department of Environmental Protection, Division of Air Quality (DAQ), received from the Eastern Panhandle Sierra Club (EPSC) on July 2, 2018 a comment letter regarding the ROXUL RAN stone wool manufacturing facility. Construction and operation of this facility was authorized pursuant to Permit Number R14-0037, issued on April 30, 2018. On March 28, 2018, a Class I legal advertisement ran in the *Spirit of Jefferson* stating the DAQ's preliminary determination to approve R14-0037 and the start of the 30-day public comment period. At that time, the draft permit, DAQ's Modeling Report, and Preliminary Determination (Engineering Evaluation/Fact Sheet) were made publicly available, including posting on the DAQ website. Although the formal comment period ended on April 27, 2018 and the permit was issued over two months ago, the DAQ is providing the following response to your recent comments (as briefly summarized in italics).

Comment 1: 1992 Demographic Data
EPSC commented that use of 1992 demographic data in the air dispersion modeling was inappropriate based on new growth around the facility since that time.

DAQ Response: Section 7.2.1.1(b)(i) of 40 CFR 51, Appendix W governs the determination of the urban or rural classification for dispersion parameterization in the AERMOD model. Appendix W states that land use of 50% or more of specific urban uses within a 3 km radius surrounding the source classifies the area within the modeling domain as "urban." Otherwise, if land use is less than 50% urban, then rural dispersion coefficients are used (i.e., there is no difference in coefficients if the land is 1% or 49% urban). Although the population of Jefferson County has increased since 1992, the current land use surrounding the plant within a 3 km radius clearly remains primarily rural in nature in accordance with metric Appendix W. A site inspection of the plant site was conducted

prior to permit issuance that visually confirmed that classifying the area as rural in the modeling was appropriate.

Comment 2: Air Dispersion Modeling Results
EPSC commented that ROXUL did not include the air dispersion modeling results within the permit application.

DAQ Response: The results of the ROXUL's air dispersion modeling were submitted under separate cover on December 21, 2017 and have been available (both hard copy and an electronic copy) upon request since that time. The electronic copy of that report was also placed at that time on the DAQ website and is still available at:

https://dep.wv.gov/daq/Documents/December%202017%20Applications/ROXUL%20Air%20Quality%20Modeling%20Report%2012-18-2017.pdf

Comment 3: Air Dispersion Modeling of Hazardous Air Pollutants (HAPs)
EPSC commented that ROXUL did not include HAPs in its air dispersion modeling.

DAQ Response: There are no state or federal requirements to conduct air dispersion modeling for HAPs and there are no state or federal air quality standards for HAPs (such as there are for criteria pollutants). Therefore, while concentrations of some HAPs may be modeled, there does not exist an objective and enforceable standard with which to compare the results. HAPS are, however, regulated through applicability under the National Emission Standards of Hazardous Air Pollutants (NESHAPs) and Maximum Achievable Control Standard (MACT) programs. This group of federal regulations - including 40 CFR 63, Subparts DDD, JJJJ, ZZZZ, and DDDDD which apply to portions of the RAN Facility - are designed to identify and mitigate HAP emissions from certain source categories and contain extensive emission limits, work practice standards, monitoring, recording, and record-keeping requirements.

Comment 4: Transient Emissions
EPSC commented that ROXUL did not separately evaluate or model transient emissions.

DAQ Response: The permit contains emission limits for all modeled sources that, along with the associated compliance determinations, monitoring, record-keeping, etc., provide practical enforceability for the emission data entered into the air dispersion model. These permit limits are inclusive of any transient emissions that may occur. It is also important to note that the only emission unit that may have any substantive transient emission deviation - of, in particular, CO, NO_x or SO_2 - is the Melting Furnace. The emissions of these pollutants from the Melting Furnace are continuously monitored and recorded using a Continuous Emissions Monitoring System (CEMS). Therefore, there is a direct link from the emissions data entered into the air dispersion models and the practically enforceable emission limits in the permit. These emission limits are applicable at all times the emission units are in operation including periods of startup, shutdown, scheduled maintenance, etc. (with the exception of events defined as "emergencies" under 2.12 of the permit).

Comment 5: Q/D Calculation
EPSC commented Q/D should be recalculated including transient emissions.

DAQ Response: A Q/D analysis is a screening methodology developed by the Federal Land Managers (FLMs) - who are tasked with an affirmative responsibility to protect Air Quality Related Values (AQRVs) at Class I Areas - to determine when it is appropriate to require an AQRV analysis during a major source/modification permitting process. The calculation of Q/D is based on the methodology as given in the Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report. The Q/D calculated by ROXUL was done according to this methodology. After providing the FLMs with the relevant information concerning the Q/D calculation and the permit application they, on January 18, 2018, notified the DAQ that an AQRV analysis was not required for the RAN Facility.

Comment 6: Curing Oven BACT

EPSC commented that the Best Available Control Technology (BACT) Determination did not adequately consider or eliminate the use of Catalytic Combustion technology on the Curing Oven.

DAQ Response: ROXUL, in its BACT analysis, lists the afterburner's estimated VOC control efficiency range as 98-99% (pp 508 of 597 of the revised permit application) and states "[a]n afterburner is the top ranked control device and best option for achieving high VOC destruction efficiency [pp 510 of 597] . . ." The catalytic oxidizer is listed as the fourth option with an estimated control efficiency range of 90-99%. There is no evidence that a catalytic oxidizer would achieve in practice a higher destruction efficiency of the specific gas stream than use of an afterburner with a properly monitored firebox temperature (pursuant to 40 CFR 63, Subpart DDD, §63.1182). As the top-ranked control option, the DAQ believes the choice of an afterburner on the Curing Oven is appropriate.

Comment 7: PM-HAPs

EPSC commented emissions of PM-HAPs such as mercury, arsenic, cadmium, and chromium were not evaluated as a potential result of use of such fuels as coal and pet coke.

DAQ Response: It is noted that ROXUL identified that the Melting Furnace is a potential source of mercury and arsenic emissions (pps 65, 66 of 597). Controlled emissions (the Melting Furnace is controlled by a baghouse) of these pollutants were estimated at amounts of 5.83×10^{-4} and 8.97×10^{-5} lbs/hour, respectively. The emission rates were based on performance testing from a facility in Denmark with a similarly designed furnace, as appropriately scaled to the RAN process. ROXUL, based on these performance tests, did not identify other PM-HAPs as potentially present at detectable levels in the exhaust gas of the Melting Furnace. It is also important to note that 40 CFR 63, Subpart DDD is designed to mitigate the emissions of PM-HAPs through the use of a surrogate particulate matter emission limit that is applicable to the Melting Furnace (0.10 lb PM per ton of melt - 4.1.4(d)(1)(i) of the permit):

> *PM means, for the purposes of [40 CFR 63, Subpart DDD], emissions of particulate matter that serve as a surrogate for metals (in particulate or volatile form) on the list of hazardous air pollutants in section 112 of the Act, including but not limited to: antimony, arsenic, beryllium, cadmium, chromium, lead, manganese, nickel, and selenium.*

Further, in the required residual risk and technology review of Subpart DDD, USEPA stated that *"[w]e retained the surrogacy of PM for non-mercury HAP metals because control of PM achieves the same level of control for non-mercury HAP metals, regardless of the concentration of those*

metals in the PM or whether the concentration of those metals varies in the PM." (July 29, 2015 Federal Register - pp 45290)

Additionally, the mechanical transfer and handling of fuels and raw feedstock materials - which are also subject to BACT and well controlled using multiple enclosures and particulate matter filters - do not produce regulated emissions of PM-HAPs. While constituent PM-HAPs may be present in some of these materials, they are bound within the matrix of the material and are not defined as HAPs until freed and released as finite particles during the combustion process. Particulate matter emissions from material handling are, however, subject BACT and are contributory sources in the air dispersion modeling used to show compliance with the National Ambient Air Quality Standards (NAAQS).

Comment 8: Odors
EPSC commented that DAQ did not consider the potential for odors at the RAN Facility.

DAQ Response: West Virginia Legislative Rule 45CSR4 (it is unclear what rule you are citing as "State Rule 5.2") is "designed to prevent and control the discharge of pollutants into the open air which causes or contributes to an objectionable odor or odors." The rule, however, does not contain any quantified odor thresholds which define the threshold of an "objectionable odor" and, instead, §45-4-2.6 defines an objectionable odor in the following qualitative manner:

> [I]n addition to odors generally recognized as being objectionable, an odor shall be deemed objectionable when in the opinion of a duly authorized representative of the Director, based upon his investigations or his investigations and complaints, such odor is objectionable.

Therefore, an objectionable odor must be determined by the DAQ in the course of an inspection or investigation of an actual odor, and it is not possible to prove quantitatively, pursuant to 45CSR4, that an objectionable odor will be present before a facility is in operation. Further, there is no qualitative indication that the facility - which is well controlled and contains extensive compliance demonstrations, monitoring, record-keeping, etc. - will produce any persistent off-site objectionable odors. If, consistent with DAQ policy, in the course of an inspection or compliant investigation, the DAQ determines that the operating facility is causing or contributing to an objectionable odor, the DAQ will take the actions as required under 45CSR4.

Comment 9: Missing Information on APCD Sheets
EPSC commented that ROXUL did not fully fill out all the information on the Air Pollution Control Device (APCD) sheets including information that would indicate potential ammonia slip from the SNCR.

DAQ Response: The Selective Non-Catalytic Reduction (SNCR) of NO_x emissions from the Melting Furnace is, as described in the process description (pp 13 of 597), an integrated system that uses the basic design of the furnace itself, along with as-needed injections of aqueous ammonia, to control NO_x emissions from the unit. The unit is not a "bolt-on" SNCR and, therefore, much of the requested information on the APCD is not applicable. Additionally, the APCD sheet filled out for the SNCR is general in nature and non-specific to de-NO_x systems so that many of the boxes on the form are not applicable to a de-NO_x system. And finally, due to the very long lead times required

for air permitting within a pre-construction program, often design/engineering is on-going with permit application review. The DAQ understands that all the information specific to some equipment may not yet be available and is yet to be determined. This is acceptable as final emission rates can be analyzed and permitted with reasonable practical enforcability written into the permit. Specific to NO_x emissions from the Melting Furnace, the permit requires the installation of a Continuous Emissions Monitoring System (CEMS) which will allow the real time monitoring of NO_x emissions from the Melting Furnace to show compliance with the associated emission limit. Concerning the potential for ammonia slip from the Melting Furnace, it is noted that ammonia is not defined as a regulated pollutant under 45CSR13 or 45CSR14 and is generally not required to be monitored unless, on a case-by-case basis, as a performance indicator of the specific de-NO_x system. This, however, is not required for the Melting Furnace as it is required to use a CEMS as noted above.

Comment 10: Formaldehyde Monitoring
EPSC commented that a formaldehyde monitor should have been required.

DAQ Response: Substantive emissions of formaldehyde occur from two sources - volatilization from the melt during the collection/curing process (originating from the formaldehyde contained in the binder) and volatilization from the application of fleece (originating from the formaldehyde contained in the fleece binder). The emissions of the former are controlled, when emitted in the Curing Oven, by the afterburner. It is also expected that almost all formaldehyde in the fleece binder will be emitted in the Curing Oven and therefore destroyed in the afterburner. To be conservative ROXUL took no credit for control of the afterburner, which inflates the potential emissions from the fleece application.

Each process is covered by a federal MACT intended to identify and mitigate HAP emissions from certain source categories. The collection/curing process is applicable to 40 CFR 63, Subpart DDD: National Emission Standards for Hazardous Air Pollutants for Mineral Wool Production. Specifically, the process is subject to a limit (§63.1178(a)) of 2.4 lb formaldehyde/ton of melt. The requirements of Subpart DDD include monitoring requirements for combined collection/curing operations [§63.1179, §63.1183], performance testing [§63.1188], notifications [§63.1191], recordkeeping [§63.1192], reporting [§63.1193], and General Provisions (NESHAP Subpart A).

The fleece application process is applicable to 40 CFR 63, Subpart JJJJ: National Emission Standards for Hazardous Air Pollutants: Paper and Other Web Coating. ROXUL will be subject to the requirements for new affected facilities under the standard, which include organic HAP (OHAP) emission limitations for web coating lines. ROXUL has chosen to comply with the emission standards by using "as-applied" compliant coatings pursuant to the procedures given under §63.3370(a)(2). This will limit the as-applied binder to a VOC content (VOCs are allowed for use as a surrogate for OHAP per §63.3370(c)(1) and (2)) of 0.016 lb-VOC/lb-binder. ROXUL's proposed binder will meet this requirement. Additionally, once constructed, ROXUL will be required to submit a notification for the startup of the Fleece Application line. ROXUL will also be required to submit a Notification of Compliance Status (NOCS) report for the Fleece Application (CM12, CM13) line in accordance with §63.3400.

Beyond the requirements in the MACT, pursuant to 4.3.2 of the permit, ROXUL will be required to conduct a performance test on emission point HE01 to determine the compliance with the emission limit for formaldehyde given under 4.1.5(a). Additionally, pursuant to 4.2.7, ROXUL will

be required to calculate and record on a monthly basis the actual amount of VOCs/HAPs emitted from the fleece application process. The amount shall be based on actual material properties and no control from the afterburner applied.

Based on the above reasons, the DAQ does not believe a formaldehyde CEMS is needed at the facility. It is also noted that ROXUL has stated their intent to use varying binder formulations as technology advances to produce formaldehyde-free resins.

Again, thank you for your comments. If you have any questions, please feel free to contact Mr. Joseph Kessler, the permitting engineer on this project, at (304) 926-0499 ext. 1219.

Sincerely,

William F. Durham
Director

cc: Ed Maguire, DEP Environmental Advocate

Exhibit G

west virginia department of environmental protection

Division of Air Quality
601 57th Street, SE
Charleston, WV 25304
(304) 926-0475

Austin Caperton, Cabinet Secretary
dep.wv.gov

September 11, 2019

Mr. Ralph A. Lorenzetti, Jr., PE PS JD
161 Clark Court
Harpers Ferry, WV 25425

Dear Mr. Lorenzetti:

Thank you for taking time to write with your concerns and questions regarding the Roxul facility in Ranson, Jefferson County, West Virginia.

I am enclosing a copy of our June 25, 2019, Response to Comments on West Virginia's annual ambient air monitoring network plan that addresses many of your concerns regarding air quality in the area and potential impacts from the Roxul facility. This document includes a map and charts regarding monitored ambient air quality in that area.

While the Division of Air Quality does not plan to add additional ambient air monitoring locations in Jefferson County, there are monitors located nearby in West Virginia, Maryland, Virginia and Washington, D.C., that provide information on air quality in the area. These sites include:

- Martinsburg, West Virginia (approximately 13 air miles from Ranson, West Virginia),
- Hagerstown, Maryland (approximately 25 air miles from Ranson, West Virginia),
- Frederick, Maryland (approximately 26 air miles from Ranson, West Virginia),
- Winchester, Virginia (approximately 20 air miles from Ranson, West Virginia), and
- Washington, D.C., McMillian air toxics trends site (approximately 52 air miles from Ranson, West Virginia).

Data collected at outdoor air monitors across the United States, including those noted above, as well as those located throughout West Virginia, can be found at https://www.epa.gov/outdoor-air-quality-data. The interactive map with monitor locations is useful and updated on a quarterly basis. Pre-generated data files are also available for download.

At this time, we are not aware of any plan Roxul has undertaken to install and operate air monitoring equipment.

Sincerely,

Laura M. Crowder, Director
DEP – Division of Air Quality

Enclosure

Response to Comments

West Virginia Department of Environmental Protection - Division of Air Quality

2019 Ambient Air Monitoring Annual Network Plan

June 25, 2019

Overview

On May 13, 2019, the West Virginia Department of Environmental Protection's Division of Air Quality (DAQ) posted the proposed 2019 Ambient Air Monitoring Annual Network Plan (ANP), and SO_2 Data Requirement Rule Annual Report, included as an appendix, to our website at www.dep.wv.gov/daq/ in the "Public Notice and Comment" section. The 30-day public review and comment period closed on June 12, 2019. No comments were received regarding the SO_2 Data Requirement Rule Annual Report. Five (5) comments were received regarding the 2019 Ambient Air Monitoring Annual Network Plan. All commenters requested air quality monitoring using federally-approved methods in Jefferson County due to concerns regarding the potential air quality impacts of Rockwool (permitted as ROXUL USA INC.), a new mineral wool manufacturing facility currently under construction in Ranson, West Virginia. Comment summaries and DAQ's responses follow the List of Commenters. A copy of the comments in their entirety will be shared with the United States Environmental Protection Agency (EPA) Region III.

List of Commenters for DAQ's 2019 Ambient Air Monitoring Annual Network Plan

1. David Michael Glenn PhD
2. Jeffrey Gustafson
3. Timothy Ross
4. Christine Marshall
5. Alix Hazel

Comment: The development of the Rockwool plant in Ranson, West Virginia has created a need for multiple Federal Reference Method (FRM) sampling sites for $PM_{2.5}$ and ozone in Jefferson County, West Virginia to protect the population and agricultural industry. Additional pollutants such as SO_2, NO_x and CO, should be also be monitored along with meteorological data and weather monitoring. There are concerns regarding hazardous air pollutant emissions. There is a need for government-approved monitoring data in Jefferson County, West Virginia.

Response: DAQ acknowledges the concerns expressed. Numerous factors are involved in determining a monitoring site location. DAQ's overall intent is to monitor ambient air, and not specifically fenceline or hotspot air quality associated with a single facility. The ambient air monitoring we conduct is designed to help assess compliance with the NAAQS, thereby, protecting air quality throughout the state. Currently, there are no federal or state regulations

that require the air agency to conduct fenceline or hotspot monitoring. In addition, DAQ does not have the staff or resources that would be necessary to operate multiple source-oriented monitors for a single facility. Currently, DAQ operates 18 ambient air monitoring stations located throughout the state. In general, procedures to establish a monitoring station are found in 40 CFR Part 58, Appendix D which can be found at: https://www.law.cornell.edu/cfr/text/40/appendix-D_to_part_58. Monitoring equipment and analysis methods must FRM or Federal Equivalent Method (FEM) standards. An updated list of these methods can be found at: https://www.epa.gov/sites/production/files/2018-12/documents/amtic_list_dec_2018_update_1.pdf. These are the guidelines used by DAQ to construct and maintain our ambient air monitoring network. While meteorological data collection guidelines are provided, weather monitoring is not included.

Information on air monitoring emissions across the state can be found at: https://dep.wv.gov/daq/. Scroll down the webpage to find the "Introduction to West Virginia Air Quality" which provides background information on air quality program implementation. Past annual reports can be found at https://dep.wv.gov/daq/Pubs/Pages/default.aspx.

A single monitoring site with FRM/FEM level monitors for criteria pollutants, including lead, and hazardous air pollutants, could be in the $200,000 - $300,000 range, when considering instrument and calibrator costs along with site construction (shelter, concrete pad, fencing, electricity). There would also be recurring costs for personnel, quality assurance, laboratory analyses, equipment maintenance and repair, and other unforeseen incidents.

While DAQ does not plan to add additional monitoring locations to the network at this time, there are monitors located nearby in West Virginia, Maryland, Virginia, and Washington, D.C., that provide information on air quality in the area, and are shown on the map below, including:

Martinsburg, WV (approximately 13 air miles from Ranson, WV);

Hagerstown, MD (approximately 25 air miles from Ranson, WV);

Frederick, MD (approximately 26 miles from Ranson, WV);

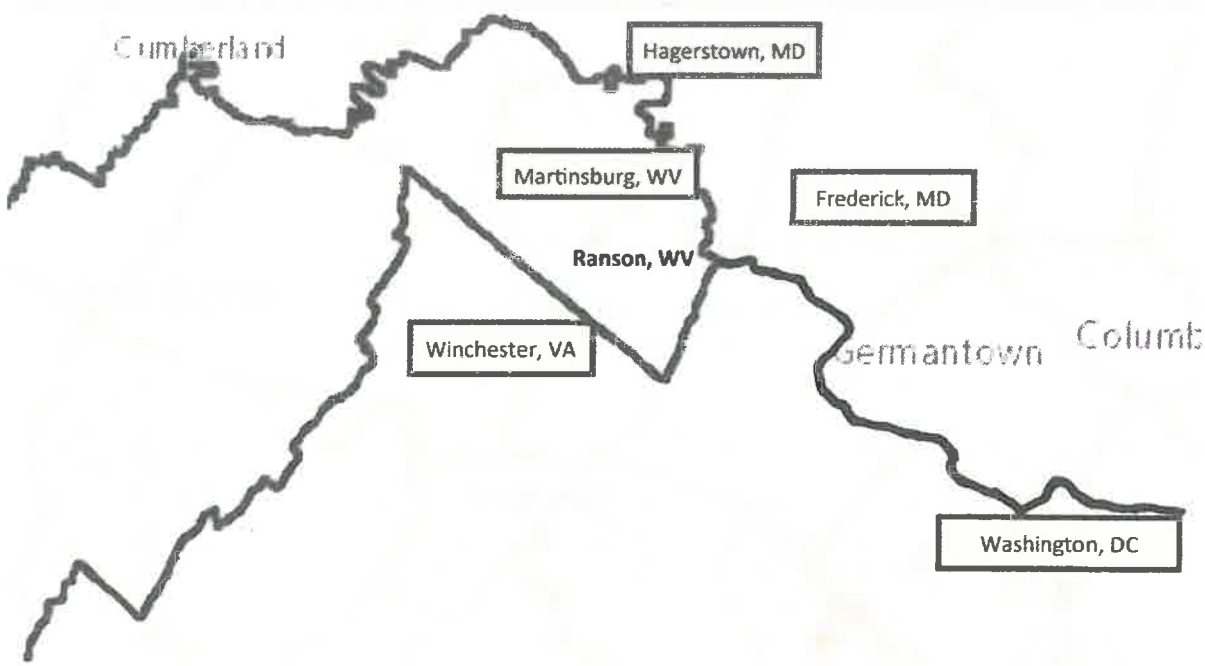
Winchester, VA (approximately 20 air miles from Ranson, WV); and,

Washington, D.C., McMillian air toxics trends site (approximately 52 air miles from Ranson, WV).

Data collected at outdoor air monitors across the United States, including those noted above as well as those located throughout West Virginia, can be found at https://www.epa.gov/outdoor-air-quality-data. The interactive map with monitor locations is useful; pre-generated data files are available for download as well. This data is updated on a quarterly basis.

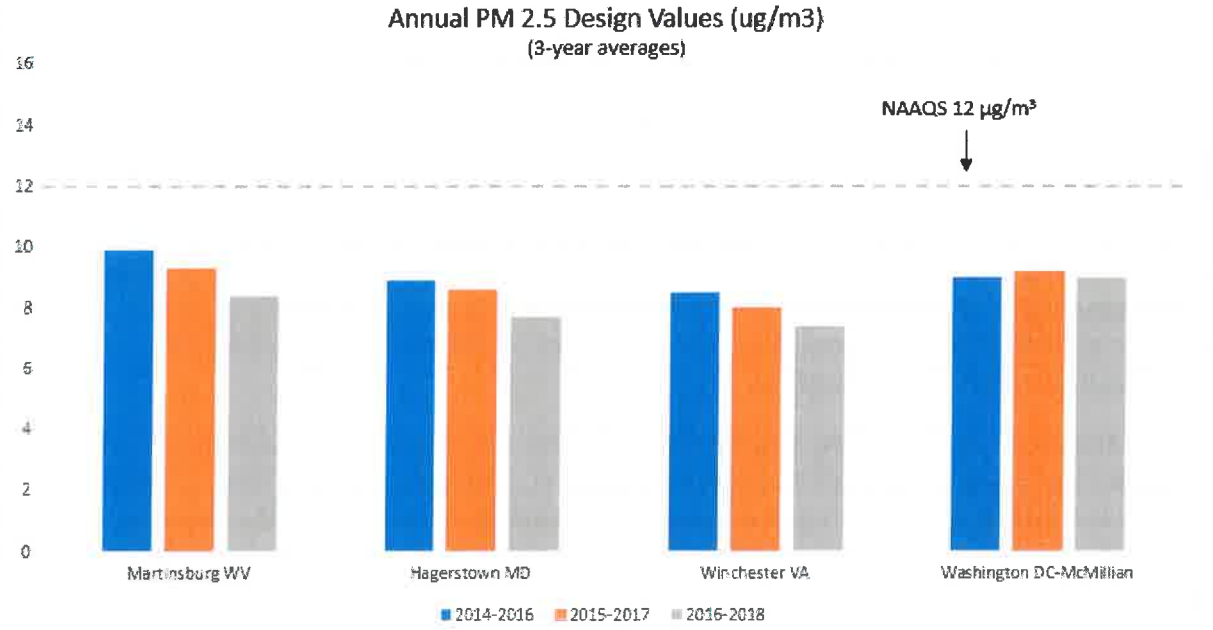
To help provide context for regional air quality, the charts below summarize the design values from monitoring data near Ranson, West Virginia, compared with EPA's National Ambient Air Quality Standards (NAAQS). These data show the current status of air quality and are evaluated on an on-going basis. The map below shows the relative locations of these air monitoring sites from Ranson, West Virginia.

Figure 1: Locations of federally-approved air monitoring sites near Ranson, West Virginia



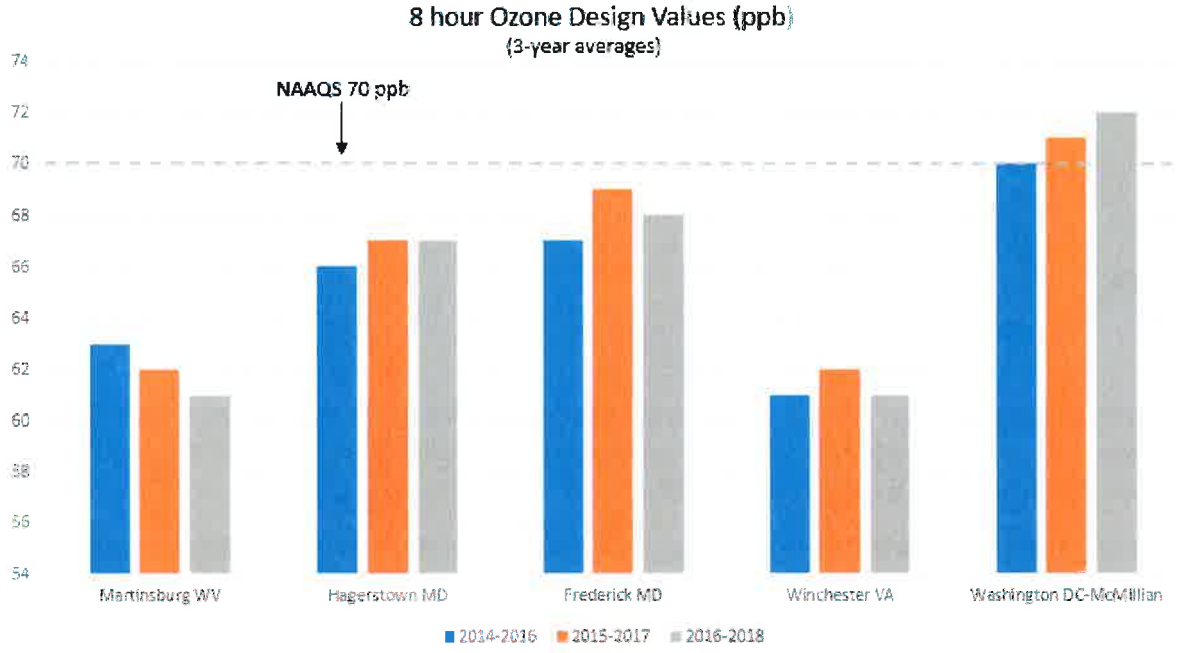
The chart below shows the Annual Mean three-year average for $PM_{2.5}$ over the past three design value years for air monitoring sites both upwind and downwind of Ranson, West Virginia. As can be seen, these monitors meet the NAAQS.

Figure 2: Annual Mean three-year average for $PM_{2.5}$ over the past three design value years for air monitoring sites both upwind and downwind of Ranson, West Virginia



The chart below shows the 8-hr ozone values for the past three design value years for air monitoring sites both upwind and downwind of Ranson, West Virginia. As can be seen, all but one of the sites meet the ozone NAAQS. The Washington, DC site does not meet the 8-hr ozone NAAQS; this site is influenced by multiple sources including mobile sources, and that air agency has primacy to address air quality issues. DAQ works with these agencies via multi-jurisdictional organizations (MJOs).

Figure 3: 8-hour ozone values for the past three design value years for air monitoring sites both upwind and downwind of Ranson, West Virginia.



<u>Comment</u>: Wind direction varies with wind speed based on Automated Surface Observing System (ASOS) data from the Martinsburg Airport. Low wind speed increases the likelihood of ozone and $PM_{2.5}$ damage to the population and agriculture with low wind speeds coming primarily from the southerly direction. Moderate to high winds come predominantly from westerly directions which is the direction of several population centers: Charles Town, Ranson, and Harpers Ferry in West Virginia; Frederick, Maryland; and Leesburg, Virginia.

ASOS data from Martinsburg Airport demonstrates the frequency of calm air (<3 knots) is 30% and the range of calm air can exceed 20 hours. Jefferson County, West Virginia experiences inversions and stagnant weather frequently. The ASOS data cannot be assumed to be representative of Jefferson County; these data were designed to be representative of a five statute mile radius.

The Rockwool plant is within close proximity to 3 public schools and is surrounded by agricultural land in which the primary crop rotation is soybean which is highly sensitive to ozone damage. Tourism opportunities, and horses, may be impacted.

Response: The ANP is not meant to address permitting issues. Nevertheless, a brief explanation is provided below and additional information can be found on the West Virginia Department of Environmental Protection's (WVDEP's) Rockwool webpage (go to www.dep.wv.gov, click on the link "For more information on Rockwool, CLICK HERE"). DAQ reviewed and replicated air dispersion analyses of proposed emissions from the Rockwool facility using EPA's federally-required Guideline on Air Quality Models (GAQM) methodology for NO_x, CO, VOC, SO_2, PM_{10}, $PM_{2.5}$; and, EPA's modeled emission rates of precursors methodology for ozone. Five (5) years of meteorological data from the Martinsburg Airport was used to obtain a wide range of potential atmospheric conditions, including calm air. The air dispersion modeling analyses and criteria are established to be protective of EPA's NAAQS. The NAAQS are set for pollutants considered harmful to public health and the environment. The Clean Air Act identifies two types of NAAQS. Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. By meeting the intermediate air dispersion modeling thresholds, the NAAQS are met, thereby protecting human health, and crops, such as soybeans, and allowing for enjoyment of the natural environment, which allows for tourism.

A copy of DAQ's March 2, 2018 Air Quality Impact Analysis Review can be found on WVDEP's Rockwool webpage (go to www.dep.wv.gov, click on the link "For more information on Rockwool, CLICK HERE"). The cumulative modeling analysis demonstrated that no modeled exceedances of the Class II increment for NO_2, $PM_{2.5}$ or PM_{10} are predicted, and that the proposed project will not cause or contribute to exceedances of the 1-hour SO_2 NAAQS. Additionally, Rockwool's cumulative impact on ozone formation (based on NO_x and VOC emissions) was below the modeled emission rates of precursors threshold. Analyses also predicted Rockwool's impacts based on both primary and secondary $PM_{2.5}$ formation was insignificant. EPA Region III reviewed DAQ's modeling approach and results; EPA provided comments to the agency which were responded to prior to issuance of the final air permit. This correspondence can also be found on WVDEP's Rockwool webpage.

Comment: Rockwool's emissions calculations [in the permit application] are suspect. They did not provide information to assess precursors to $PM_{2.5}$ emissions.

Response: The ANP is not meant to address permitting issues. However, please see the previous response for a discussion on DAQ's air quality impact analysis review conducted as part of the overall permitting evaluation for the Rockwool facility. Analyses predicted Rockwool's impacts based on both primary and secondary $PM_{2.5}$ formation would be insignificant. In addition to stack testing, the DAQ permit incorporates on-going parametric monitoring of process conditions, including continuous emissions monitoring on some processes, to determine if the

permitted emissions limits are being met. The permit can be found at WVDEP's Rockwool webpage (go to www.dep.wv.gov, click on the link "For more information on Rockwool, CLICK HERE").

Comment: Jefferson County, West Virginia abuts Loudoun County, Virginia and Frederick County, Maryland, both are 2015 8-hr ozone non-attainment areas. Rockwool's increase in NO_x emissions is a precursor for ozone.

Response: The ANP is not meant to address permitting issues. However, please see the previous response for a discussion on DAQ's air quality impact analysis review conducted as part of the overall permitting evaluation for the Rockwool facility. While there are ongoing ozone attainment issues in nearby areas, DAQ's air quality impact analysis review determined that proposed emissions from the Rockwool facility would be below EPA's significant impact level (SIL) for ozone (including NO_x and VOC precursors) and therefore would not cause or contribute to any violation of NAAQS.

Comment: DAQ should request EPA perform a detailed study of Jefferson County taking into account transport of pollutants into Jefferson County from the Southwest. The draft ANP states that $PM_{2.5}$ in Martinsburg, WV has not exceeded NAAQS in recent history, yet EPA fined Argos Cement $1.5 Million recently for over five years of exceeding their permitted emissions limits. The Martinsburg air monitor is in close proximity to the cement plant.

Response: Planning efforts at state, regional, and federal levels develop air inventories of emissions from a wide variety of sources, conduct air dispersion modeling, and evaluate the impacts both upwind and downwind to ensure the NAAQS are met. These efforts occur within DAQ, as well as MJOs, and EPA.

Permitted emission limits are established so that no one facility is allowed to cause or contribute to a violation of NAAQS. This approach also establishes a framework in which aggregate emissions from multiple facilities do not exceed NAAQS. Even in the unfortunate circumstance of a violation of an emission limit at a facility, a NAAQS violation typically does not occur.

Comment: West Virginia should work with Maryland to develop proper monitoring of the eastern panhandle, and Maryland should be made aware of the increase of pollution they should expect if the proposed Rockwool plant becomes operational. Maryland and the EPS [sic, EPA] should be informed of the state-supported industrialization of Jefferson County, West Virginia.

Response: As discussed in the response to the first comment, there are monitors located near Ranson, in West Virginia itself, as well as Maryland, Virginia, and Washington, D.C. that provide information on air quality in the area. The ANP is not meant to address permitting

issues. However, the permitting public review procedures of 45CSR13 and 45CSR14 provide for notice to a number of officials and agencies. A copy of the preliminary determination, draft permit, and public notice were forwarded to EPA Region 3, the National Park Service (NPS) and the US Forest Service (USFS). A non-confidential copy of the application, complete file, preliminary determination and draft permit were made available for public review during the public comment period at the DAQ Headquarters in Charleston and on DAQ's website. Additionally, a copy of the public notice was sent to the mayor of Ranson, West Virginia; the County Clerk of Jefferson County, West Virginia; the Virginia Department of Environmental Quality (VDEQ); and the Maryland Department of the Environment (MDE).

Comment: A large industrial park is planned in Ranson/Kearneysville along State Route 9; Rockwool will be the anchor industry. There is concern with increasing air quality impacts, and a baseline of ambient air monitoring data is needed before the Rockwool facility begins operation sometime in mid-2020 as well as prior to further industrialization of Jefferson County, West Virginia.

Response: DAQ's statewide air program requires that facilities obtain permits with emission limits on air pollutants that meet state and federal emissions standards. As noted above, permitted emission limits are established so that no single facility is allowed to cause or contribute to a violation of NAAQS. This approach also establishes a framework in which aggregate emissions from multiple facilities do not exceed NAAQS.

Comment: Rockwool has promised to install sensors at their plant site and have not.

Response: DAQ is not aware of any activity Rockwool has undertaken to install and operate either sensors or FRM/FEM air monitors.

Comment: The ANP should include more than just one picture of a station. One should be able to have a 360 perspective in order to see obstructions and provide metadata.

Response: The requirements for the ANP are found in 40 CFR 58.10 and these do not mention photographs – photographs were requested by EPA to be included over the years in order to bolster the site description. The latitude/longitude coordinates are part of the monitor description, and provide enough information to locate the site on GIS tools such as Google Earth.

Comment: The description of the Kanawha County NCore site lists an ultrasonic meteorological sensor. This should be referred to as an ultra-sonic wind sensor.

Response: Thank you for pointing this out; it has been corrected.

Comment: The Purple Air Network shows a significantly different situation from the $PM_{2.5}$ monitor data in Martinsburg, West Virginia. We have many green days and we need to keep them that way as much as possible. When Purple Air Monitors report $PM_{2.5}$ significantly higher than the Weather Channel, clearly something is not right.

Response: DAQ agrees that air quality should be maintained and improved to meet EPA's NAAQS, including for $PM_{2.5}$. The $PM_{2.5}$ NAAQS is met statewide in West Virginia. The $PM_{2.5}$ monitor in Martinsburg, West Virginia meets the FRM criteria and shows that air quality is within the NAAQS. Purple Air sensors do not meet EPA's FRM/FEM criteria for data acceptability. EPA is currently evaluating a number of sensors (commercially available, lower cost air monitoring devices), including Purple Air, for comparison with FRM/FEM monitors. We were unable to verify that the Weather Channel provides Air Quality Index (AQI) data and if so, from what data source.

EPA's AQI is a tool that provides timely, easy-to-understand information on local air quality and whether air pollution levels pose a health concern. EPA's interactive map with AQI data can be found at https://gispub.epa.gov/airnow/. DAQ's AQI information in tabular format can also be found at https://dep.wv.gov/daq/air-monitoring/Pages/AirQualityIndex.aspx. The Martinsburg, West Virginia AQI is from the ozone monitor which provides continuous data. The $PM_{2.5}$ monitor is not continuous and, therefore, is not included in the instantaneous AQI. Instead, the $PM_{2.5}$ monitor at the Martinsburg, West Virginia site is a filter-based FRM monitor that runs on EPA's national one-in-three day schedule. This $PM_{2.5}$ data is easily accessible, along with additional air monitoring data collected by state and local agencies. Please see the response to the first comment for these links.

As part of an overall effort by EPA to develop sensors and citizen science, the South Coast Air Quality Management District in California is conducting side-by-side evaluations of sensors with FRM/FEM air monitoring equipment. A summary of evaluations, including for the Purple Air sensor, can be found at http://www.aqmd.gov/aq-spec/evaluations/summary-pm.

Ralph A. Lorenzetti, Jr. PE PS JD

161 Clark Court

Harpers Ferry, WV 25425

September 6, 2019

Laura M. Crowder

Director of Air Quality

West Virginia Dept. of Environmental Protection

601 57th Street, SE

Charleston, WV 25304

RE: Jefferson County Rockwool

Dear Ms. Crowder,

Note that last year I ran for and was elected to the County Commission of Jefferson County. I ran after noting in the local newspaper that Rockwool had approval to build twin 220ft stacks to abate its air admissions. I have a viewpoint against dispersion of pollution as a mere masking of possible accumulative pollutants from multiple sources down wind. This I told the Rockwool VP for North America, his response was not comforting. In a prior career I was a Project Sanitary/Environmental Engineer with the US EPA Region III, Wheeling WV Field Office, Surveillance & Analysis, dealing with both water and pollution. I had other tasks at Wheeling and DC and it was many years ago, but some fears stay with you. The foundation of the factory is under construction and there have been many promises for future down-wind monitoring, but the reality of the monitoring uncertain. My question is will there be an actual monitoring station near the North Jefferson School and down-wind either/and in Millville and on Blue Ridge Mt. This should be the minimum. If no down-wind monitoring by the WVDEP why?

Sincerely,

Ralph A. Lorenzetti, Jr.

PS: all my children and grandchildren live down-wind.

Exhibit H

Kindrick, Pamela K

From: Kimberly Burgess <kimberly.burgess@rockwool.com>
Sent: Wednesday, January 22, 2020 3:40 PM
To: Kindrick, Pamela K
Cc: Dan Lund Sørensen; Peter Regenberg
Subject: [External] RAN Facility Plant ID 03700108

CAUTION: External email. Do not click links or open attachments unless you verify sender.

Hello Pamela,

I am the SHEQ Manager for the Rockwool Ranson operation. Michael Hodge with ERM notified me that I would need to contact you in order to change the address and contact information for this site.

Currently the contact information for the site is listed as:

Mette Drejstel
ROXUL USA INC.
71 Edmond Road, Suite 6
Kearneysville WV 25430

In the future, please send all correspondence to the following address:

Kimberly Burgess
ROXUL USA INC.
665 Northport Avenue
Kearneysville WV 25430

I would appreciate you help with this matter.

Please contact me if you need any further information.

Kind regards,

Kim Burgess

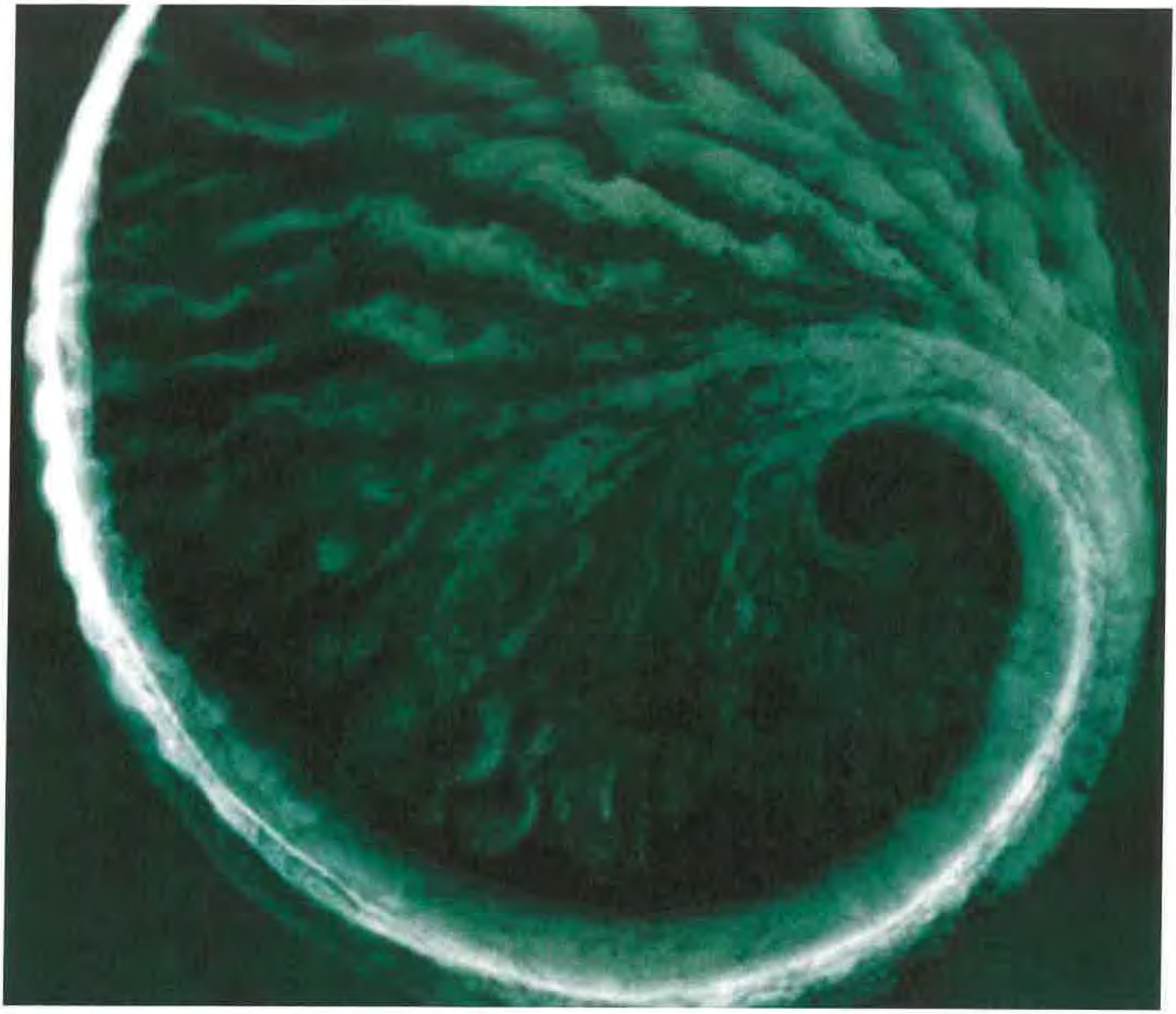
Kimberly Burgess, CSP
SHEQ Manager

ROCKWOOL – RAN5
665 Northport Avenue
Ranson, WV 25430

M +1 681-247-0034
Rockwool.com

Exhibit I

REVISED (XTRA COPY) *FILE COPY*



ROXUL™

ORIGINAL

Prevention of Significant Deterioration (PSD) Application for the Construction of a Mineral Wool Manufacturing Facility

Roxul USA, Inc.
Jefferson County, West Virginia

January 2018

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D.9 GREENHOUSE GAS BACT ANALYSIS

The GHG BACT analysis will be conducted using the same five-step "top-down" process outlined in Section D.1. In the USEPA document, *PSD and Title V Permitting Guidance for Greenhouse Gases*, potentially applicable control alternatives have been identified and evaluated according to the following three categories:

1. Inherently lower-emitting processes/management practices and methods/system designs;
2. Add-on controls; and
3. Combinations of inherently lower emitting processes/practices/ designs and add-on controls.

The BACT analysis should consider potentially applicable control techniques from these three categories to capture a broad array of potential options for pollution control. An important consideration for mineral wool production facilities is the source definition. USEPA permit guidance indicates that the Clean Air Act (CAA) does not provide latitude for a permitting authority to redefine a source as part of a BACT evaluation. Specifically, USEPA recognizes the following:

> *"a ... list of options need not necessarily include inherently lower polluting processes that would fundamentally redefine the nature of the source proposed by the permit applicant."*[31]

A series of white papers have been developed by the USEPA that summarize readily available information on control techniques and measures to mitigate GHG emissions from specific industrial sectors. These white papers are intended to provide basic information on GHG control technologies and reduction measures to assist regulatory agencies and regulated entities in implementing technologies or measures to reduce GHGs under the CAA, particularly in permitting under the Prevention of Significant Deterioration (PSD) program and the assessment of BACT. Of interest for this BACT analysis, USEPA has developed a white paper for the Portland cement industry, *Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from the Portland Cement Industry*. Although the mineral wool sources are not generally similar to Portland cement sources, the processes share conceptually similar characteristics; therefore, similar CO_2e emissions controls may be relevant.

Only technologies that are relevant to the proposed equipment and fit within the business objectives of the facility should be considered in Step 1 of a BACT evaluation. For example, factors such as fuel type (coal versus solar or wind)

[31] PSD and Title V Permitting Guidance for Greenhouse Gases, EPA-457/B-11-001. Office of Air Quality Planning and Standards, Air Quality Policy Division, Research Triangle Park, NC, March 2011. Available on-line at: https://www.epa.gov/sites/production/files/2015-12/documents/ghgpermittingguidance.pdf.

would be considered part of the "source definition" for a melting furnace. In general, there are two strategies available to minimize GHGs for mineral wool production: (1) add-on control via carbon capture systems and (2) energy efficiency methods.

Although USEPA has historically interpreted the BACT requirement to be inapplicable to secondary emissions, which do not come from the source itself, energy efficient methods should be considered and can be classified in two categories. The first category includes technologies or processes that maximize the energy efficiency of the individual emissions unit and the second category includes energy efficiency improvements that can improve utilization of thermal energy and electricity that is generated and used on site. USEPA recommends consideration of process improvements for a facility's higher-energy-using equipment, processes, or operations. The Melting Furnace will be the most energy-intensive operation, accounting for 62.5% of the facility's GHG emissions; therefore, energy efficient measures pertaining to the melting operation will have the most direct impact on GHG emissions and are included in this analysis.

D.9.1 GREENHOUSE GAS EMISSIONS

The GHG Tailoring Rule regulates emissions from six (6) covered GHG pollutants: CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorinated compounds (PFCs), and sulfur hexafluoride (SF_6). GHG emissions associated with combustion equipment are limited to CO_2, CH_4 and N_2O.

Carbon dioxide emissions are created in various ways, including as a by-product of burning fossil fuels and biomass, as well as from land-use changes and other industrial and natural processes. CO_2 is formed through the complete oxidation of organic material. All fossil fuels contain significant amounts of carbon, and during combustion, the fuel carbon is oxidized into CO and CO_2. Full oxidation of fuel carbon to CO_2 is deemed the most acceptable emission by some government agencies because CO has long been a regulated pollutant with established adverse health impacts, and because full combustion releases more useful energy within the process, maximizing energy conservation and efficiency.

Methane emissions result from incomplete combustion. Incomplete combustion can also result in emissions of PM, CO, and organic HAP.

Nitrous oxide emissions from combustion result primarily from low temperature combustion (between temperatures of 900 to 1,700°F) and conditions of excess O_2.

D.9.2 Description of CO_2e Control Technologies

Global Warming Potentials (GWPs) are used to calculate CO_2e to normalize emissions of pollutants such as CH_4 and N_2O, which are deemed to have a

greater detrimental impact on a mass basis than CO_2. Potential control options are addressed for CO_2e below. Because the primary GHG emitted by Roxul's mineral wool production facility will be CO_2, the control technologies and measures presented in this section focus on CO_2 control technologies.

D.9.2.1 CO_2 Control Technologies

Discussions of CO_2 control technologies and other measures are presented below.

Carbon Capture and Sequestration

Carbon capture and sequestration (CCS) can make a contribution to the overall GHG reduction effort by reducing the emissions of CO_2 from the use of fossil fuels. CCS is the only potentially available add-on control option to reduce large-scale direct emissions from industrial processes.[32] CCS is the long-term isolation of fossil fuel CO_2 emissions from the atmosphere through capturing and storing the CO_2 deep in the subsurface of the Earth. CCS is made up of three key stages:

1. Capture: Carbon capture is the separation of CO_2 from other gases produced when fossil fuels are combusted. Post-combustion CO_2 separation can be performed with chemical absorption systems using aqueous solution of amines as chemical solvents, or physical absorption systems using methanol or other solvents.
2. Transport: After separation, CO_2 is compressed to facilitate transportation and storage if a locally available site for direct injection is unavailable. After compression, CO_2 is transported via pipeline to a suitable geologic storage site.
3. Storage: At a storage site, CO_2 is injected into deep underground rock formations, often at depths of one (1) km or more. Appropriate storage sites include depleted oil fields, depleted gas fields, or rock formations which contain a high degree of salinity (saline formations). These storage sites generally have an impermeable rock above them, with seals and other geologic features to prevent CO_2 from returning to the surface. Monitoring, reporting, and verification are important to demonstrate that CO_2 is safely stored.

Energy Efficiency Measures

Thermal efficiency is an emissions reduction strategy focused on increasing energy efficiency. Higher thermal efficiency means less fuel is required for a given output, which directly results in lower GHG emissions. Important design factors vary depending on the emissions source.

[32] The Global Status of CCS: 2016 Summary Report. Global CCS Institute, Canberra, Australia, November 2016. Available on-line at: http://hub.globalccsinstitute.com/sites/default/files/publications/201158/global-status-ccs-2016-summary-report.pdf

In addition to maximizing thermal efficiency, certain measures may be implemented to maintain energy efficient operations. These measures may be related through technologies, processes, and practices at the emitting unit and are discussed in detail, depending on the emissions source. Consideration must be given to the individual and overall impact of various energy efficient measures to ensure a source is constructed and operated in a manner consistent with the energy efficient goals determined to be BACT. Energy efficiency measures were identified based on recent permit applications, European Commission Joint Research Centre's "Best Available Techniques (BAT) Reference Document for the Manufacture of Glass," and USEPA's Portland cement industry guidance document.

Lower Carbon Fuels

$CO_2$is produced as a combustion product of any carbon containing fuel. All fossil fuels contain varying amounts of fuel-bound carbon that is converted during the combustion process to produce CO and CO_2. However, the use of lower carbon content gaseous fuels such as pipeline-quality natural gas, compared to the use of higher carbon containing fuels such as coal, pet-coke or residual fuel oils, can reduce CO_2 emissions from combustion. The use of lower carbon containing fuels can be an effective means to reduce the generation of CO_2 during the combustion process for sources with natural gas combustion capabilities.

D.9.2.2 CH_4 Control Technologies

Specific technologies and mitigation approaches for CH_4 vary by emission source due to different characteristics and emission processes. CH_4 emissions can be reduced by operating combustion processes with higher flame temperatures and higher excess O_2 levels. Available control technologies for the control of CH_4 emissions are the same as for the control of CO and VOC emissions, and include good combustion practices, oxidation catalysts, and thermal oxidation. Unfortunately, techniques for reducing CH_4 emissions can increase NO_x emissions. Consequently, achieving low CH_4 and low NO_x emission rates is a balancing act in combustion process design and operation. In general, installing controls on combustion sources for CH_4 emissions alone would not be cost-effective. Mitigation options can include: technology or equipment upgrades; improvement of management practices; and improvement of operational procedures.

D.9.2.3 N_2O Control Technologies

N_2O is generally emitted from industry through fossil fuel combustion, so technological upgrades and fuel switching are effective ways to reduce industry emissions of N_2O. N_2O emissions can be minimized when combustion temperatures are kept high (above 1,475°F) and excess O_2 is kept to a minimum (less than 1%). The control of N_2O emissions is primarily achieved through reductions in fossil fuel consumption through energy efficiency and energy

saving measures. Because N_2O emissions will be a small fraction of the GHG emissions produced, installing controls for N_2O emissions alone would not be cost-effective.

D.9.3 Energy Improvements for Facility Operations

Energy efficiency improvements can be made by effectively managing the energy used in facility operations. Roxul will work to utilize energy optimizations and reduce off site energy demand. While Roxul works to further energy efficiency in any way possible, the energy efficiency improvements listed below are not considered BACT for on-site emission sources. These energy efficiency improvements generally improve off-site or secondary GHG emissions and are discussed for a complete overview of the facility.

Table D-9-1 lists energy efficiency improvements that are potentially applicable for operations at the Roxul Facility, along with a description of the energy efficiency measures and proposed methods for implementation.

Table D-9-1 Energy Efficiency Improvements for Operations at the Roxul Facility

Energy Efficiency	Description	Proposed Implementation
High Efficiency Motors	A motor management plan can reduce electricity use and save in energy and maintenance costs.	National Electrical Manufacturers Association (NEMA) or equivalent (IE3) motors will be applied for all standard motors (with exceptions for specific process integrated equipment).
Variable Frequency Drives (VFDs)	Variable frequency drives can reduce energy consumption and therefore reduce CO_2 emissions.	VFDs will be used for controlling and optimization of process.
Optimization of Compressed Air Systems	Implementing an optimized design and control system for compressed air systems and other efficiency improvements can reduce energy consumption.	Roxul plans to implement an optimized design and control system with distribution system for compressed air.
Lighting System Efficiency Improvements	Automated lighting controls and lights with more efficient bulbs can reduce energy use. For example, replacing T-12 lights with T-8 lights, replacing mercury lights with metal halide or high pressure sodium lights, and/or replacing electronic ballasts with magnetic ballasts can reduce energy consumption.	Roxul plans to use automated lighting controls and lights with efficient bulbs when practical.
Use of Thermal Oil System	Indirect heat transfer will be done by a thermal oil system as a pre-heating transfer of energy and to extract heat for heat recovery.	Roxul plans to use thermal oil system to heat buildings.

Roxul will use energy efficient electric equipment (motors and fans) and controls where feasible and practical to reduce power consumption.

D.9.4 *GHG BACT Determination For Melting Furnace*

Mineral wool production is a high temperature, energy-intensive process; however, environmental benefits associated with the products include energy savings during the consumer usage. The energy-saving benefits of mineral wool products are not quantified in this analysis, but are documented and readily available. CO_2e emissions from the melting furnace are generated primarily from fuel combustion, the decomposition of carbonates, and from the oxidation of other carbon containing raw materials in the batch. Emissions of CO_2e are strongly dependent on the energy efficiency of the melting process.

Step 1 - Identify Potential Control Technologies

Based upon this review of BACT emission limits and control technologies for similar operations, the following control technologies are potentially available for reducing CO_2e emissions from the Melting Furnace:

1. Carbon capture and sequestration;
2. Energy efficiency measures
3. Lower carbon fuels

A description of each of the identified technologies or processes is presented previously in Section D.9.2.

Carbon capture has not been demonstrated for mineral wool manufacturing facilities and is not commercially available for mineral wool melting furnaces. It is unknown if this technology is viable for mineral wool facilities, particularly due to the relatively high criteria pollutant loading in the exhaust stream; however, CCS is evaluated further.

Step 2 - Eliminate Technically Infeasible Options

The technical feasibility of each control strategy identified under Step 1 of the BACT analysis has been evaluated by reviewing whether the specific technology is available for the application and is effective at reducing CO_2 emissions. The following control technologies have been determined to be not technically feasible and have been eliminated from further consideration.

Lower carbon fuels

Coal and natural gas are the predominant fuels that will be used in the melting process. Changing fuels could reduce GHGs; however, these design changes would fundamentally redefine the process of a coal/natural gas/oxy-fired

Melting Furnace. The use of coal as a combustion fuel, in preference over PET coke, results in fewer GHG emissions per unit of energy output. This property is reflected in 40 CFR Part 98, Table C-1 (the Mandatory Reporting Rule for Emissions of Greenhouse Gases), where coal is ranked as having a lower CO_2e generation rate than coke (21.68% less). Natural gas, the fuel that results in the lowest GHG emissions per unit energy output, is the primary fuel used elsewhere in the plant.

A reduction in CO_2 emissions could be realized by switching from a traditional fossil fuel to a biomass fuel (such as animal meal, waste wood products, sawdust, and sewage sludge), which could be considered to be a carbon-neutral fuel. Roxul is currently researching and will conduct small scale testing on biofuels for this purpose; however, these biomass fuels must have sufficient heating value and consistent quality to reach the required Melting Furnace temperature. As such, biofuels are in the development stage and are not technically feasible.

With respect to the use of "clean fuels" on page 27 of the GHG guidance document, USEPA states:

> *The CAA includes "clean fuels" in the definition of BACT. Thus, clean fuels which would reduce GHG emissions should be considered, but EPA has recognized that the initial list of control options for a BACT analysis does not need to include "clean fuel" options that would fundamentally redefine the source. Such options include those that would require a permit applicant to switch to a primary fuel type (i.e., coal, natural gas, or biomass) other than the type of fuel that an applicant proposes to use for its primary combustion process.*

Therefore, based on USEPA policies and guidance, the use of lower carbon containing fuels is not an available or technically feasible control alternative for this project, since the use of other fuels would fundamentally redefine the project.

Carbon Capture with Dedicated Sequestration

Dedicated geological sequestration of CO_2 requires close proximity to a favorable geologic formation. The proposed Roxul facility will be located in the Eastern Mesozoic Rift Basins, which neighbors the Eastern Mid-Continent area. A recent report from the US Geological Survey (USGS)[33], National Assessment of Geologic Carbon Dioxide Storage Resources, indicates that within the area of the Eastern Mesozoic Rift Basins, there is potential for subsurface CO_2 storage capacity that is technically accessible (only buoyant trapping storage resources). The Eastern Mesozoic Rift Basins only accounts for less than 1% of potential buoyant trapping storage capacity within the United States. Currently, there are no facilities actively using these types of storage resources in the Eastern Mesozoic Rift Basins.

[33] National Assessment of Geologic Carbon Dioxide Storage Resources, US Department of the Interior, June 2013, revised September 2013. Available on-line at: http://pubs.usgs.gov/circ/1386/

In the neighboring Eastern Mid-Content area, there is potential for subsurface CO_2 storage capacity that is technically accessible (both buoyant and residual trapping storage resources). The Eastern Mid-Continent only accounts for less than 8% of potential buoyant and residual trapping storage capacity within the United States. The Appalachian Basin is closest basin that has been assessed, and is located approximately 200 miles away. Roxul's facility will not be located within the boundaries of this basin.

A geologic validation phase CO_2 storage project[34] was conducted to examine the feasibility of injecting CO_2 into three different deep rock formations in the Appalachian Basin at depths between 5,900 and 8,300 feet. The rock formations, the Oriskany, Salina, and Clinton/Medina, are representative of formations that are pervasive across the Appalachian Valley. The test indicated that porosity, void space, and permeability of target formations were lower than expected, and the validation test site did not have sufficient porosity and permeability for completing a small scale injection of 3,000 tons of CO_2 as planned. The results of this project provided valuable geologic understanding and lessons within an area of the Appalachian Basin that has few existing deep wells for geologic characterization. As a result, there are no nearby sites that have been characterized will sufficient CO_2 storage capacity[35] and there are no known favorable geologic formations near Roxul.

Without a nearby storage location, CCS with dedicated sequestration becomes infeasible.

Step 3 - Rank Remaining Technically Feasible Control Options

1. Carbon capture with transport and sequestration.
2. Energy efficiency measures.

Step 4 - Evaluate Remaining Control Technologies

Carbon Capture with Transport and Sequestration

CCS is a three-step process that includes the capture of CO_2 from industrial sources, transport of the captured CO_2 (usually in pipelines), and storage of that CO_2 in suitable geologic reservoirs. There are neither geologic reservoirs, nor pipelines dedicated to CO_2 transport available near the proposed project at this time. Notwithstanding the infrastructure issues, an economic evaluation of CCS is included in this BACT analysis for completeness purposes. The economic feasibility of transporting CO_2 for sequestration at a distant storage site depends on whether a long-distance pipeline exists within a reasonable distance of the facility to make a connection to the system.

[34] Midwest Regional Carbon Sequestration Partnership, R.E. Burger – Validation Phase. Available on-line at: http://www.mrcsp.org/r-e-burger-site---validation-phase

[35] NATCARB Viewer, October 2017. Available on-line at: http://www.natcarbviewer.com/

Approximate costs for capturing, transporting, and storing the CO_2 emissions from the Melting Furnace are shown in Appendix D-1. At approximately $176 per ton of CO_2e controlled, utilizing Carbon Capture with Transport and Sequestration for the Melting Furnace is found to be economically infeasible.

Energy Efficiency Measures

Roxul will implement unique process improvements with a focus on energy efficiency. The Melting Furnace is the most energy intensive unit operation in the facility, and as such, the process design maximizes the use of energy input.

Recycled wool waste can be remelted in the furnace without briquetting. Direct material input removes additional any energy requirements for briquetting and energy consumption will be further reduced because wool requires less energy to re-melt than raw materials. The furnace is able to utilize raw materials that do not exist in lump form, e.g., waste from production, thus saving virgin raw materials and reducing waste that would otherwise go to a landfill.

Table D-9-2 includes a list of energy efficiency measures that are applicable to the Melting Furnace, along with a description of the energy efficiency measures and proposed methods for implementation.

Table D-9-2 Melting Furnace Energy Efficiency Measures

Energy Efficiency Measure	Description	Proposed Implementation
Refractory Material Selection	The refractory material lining the Melting Furnace is the primary insulating material.	The Melting Furnace will be lined on the inside with a special refractory which maintains the heat in the combustion zone and minimizes heat transfer losses to the steel jacket and cooling water.
Use of Recycled Materials to Reduce Energy Demand	Recycled wool waste materials can melt at a lower temperature thus reducing the fuel energy demand.	Recycled wool will save raw materials in addition to demanding less energy to melt. Decomposition of carbonates to CO_2 will be reduced.
Heat Recovery from Process Streams	Exhaust streams with significant amounts of heat energy can be recovered for other heating purposes.	Multiple heat integration plans will be implemented using the unused heat from the melting process, such as: Hot off gas from melting is heat exchanged with Melting Furnace incoming air. Heat loss in Melting Furnace cooling water will be utilized to heat factory and office buildings, for domestic hot water.
Use of Preheaters	Preheaters allow higher energy transfer efficiency and lower fuel requirements.	Air to the Melting Furnace will be pre-heated.
Furnace Design	An excess of oxygen allows for the conversion of organic pollutants to CO_2, which possesses the lowest global warming potential.	The melt process is an oxidizing process, which operates with an excess of oxygen.
O_2 Enrichment	O_2 enrichment could increase combustion	O_2 enrichment will be used in the

Energy Efficiency Measure	Description	Proposed Implementation
	efficiency, reduce exhaust gas volume, and reduce available N_2 that may form NOx.	melting process to optimize complete combustion.

RBLC entries for various combustion sources were reviewed. These entries support a CO_2e emission limit basis of tpy or tpy rolling 12-month. A rolling 12-month basis is appropriate because there is no ambient air quality driver for reducing the averaging period for GHGs.

Step 5 - Selection of BACT

For CO_2e emissions generated from the Melting Furnace, BACT is selected to be the implementation of energy efficiency measures identified in Step 4. Energy efficiency measures are the only remaining technically and economically feasible control option for minimizing CO_2 emissions from the Melting Furnace. No adverse energy, environmental, or economic impacts are associated with the selected control option. The proposed numerical BACT emission limits are shown in Attachment O.

D.9.5 GHG BACT Determination For Natural Gas Combustion Units

CO_2e emissions from combustion units identified below will result from the combustion of natural gas. In a properly tuned boiler, heater, or oven, nearly all of the fuel carbon in natural gas is converted to CO_2 during the combustion process. This conversion is relatively independent of combustor type. Unconverted fuel carbon results in emissions of CH_4, CO, and/or other VOC emissions due to incomplete combustion. Even boilers and heaters operating with poor combustion efficiency produce insignificant amounts of CH_4, CO, and VOC compared to CO_2 levels. Thus, the following control analysis focuses on CO_2 emissions. The following sources utilize natural-gas fired burners and have been grouped together to streamline this GHG analysis:

- Pre-heat burner (IMF24)
- Curing Oven Burners (HE01, Curing Oven Afterburner, Curing Oven Circulation Burner #1, and Curing Oven Circulation Burner #2)
- Product Marking (P_Mark)
- High Oven A (RFNE3)
- High Oven B (RFNE9)
- Drying Oven 1 (RFNE4)
- Drying Oven 2 & 3 (RFNE6)
- Natural Gas Boiler 1 (CM03)
- Natural Gas Boiler 2 (CM04)
- RFN Building Heat (RFN10)

- Coal Mill Burner & Baghouse (IMF05)

Step 1 - Identify Potential Control Technologies

The following technologies and innovative processes were identified as potential control measures for CO_2e emissions associated with the natural gas combustion units.

1. Carbon Capture and Sequestration
2. Energy Efficiency Measures
3. Lower carbon fuels

Step 2 - Eliminate Technically Infeasible Options

The technical feasibility/infeasibility of each control strategy identified under Step 1 of the BACT analysis has been evaluated by reviewing whether the specific technology is available for the application and is effective at reducing CO_2 emissions.

Carbon Capture with Dedicated Sequestration

Dedicated geological sequestration of CO_2 requires close proximity to a favorable geologic formation. CCS with dedicated sequestration is technically infeasible for the reasons included in Section D.9.4.

Step 3 - Rank Remaining Technically Feasible Control Options

1. Carbon Capture with Transport and Sequestration.
2. Lower carbon fuels.
3. Energy Efficiency Measures.

Step 4 - Evaluate Remaining Control Technologies

Carbon Capture with Transport and Sequestration

The exhaust streams from each of the natural gas combustion sources will be relatively dilute in CO_2 content, compared to projects that typically utilize CCS. Additional processing of the exhaust gas will be required to implement CCS, especially for units containing process particulates in the gas stream.

CCS is a three-step process that includes the capture of CO_2 from power plants or industrial sources, transport of the captured CO_2 (usually in pipelines), and storage of that CO_2 in suitable geologic reservoirs. Post-combustion capture through amine absorption is available for CO_2 separation processes. Utilizing a long-distance pipeline to deliver captured CO_2 to sequestration sites would virtually eliminate CO_2 emissions from these combustion sources.

Approximate costs for capturing, transporting, and storing the CO_2 emissions from the natural gas combustion units are shown in Appendix D-1. At approximately $595 per ton of CO_2e controlled, utilizing CCS for the natural gas combustion units is found to be economically infeasible.

Lower Carbon Fuels

The use of natural gas as a combustion fuel, in preference over other fossil fuels such as oil or coal, results in fewer GHG emissions per unit of energy output. This property has been well documented, and is reflected in 40 CFR Part 98, Table C-1 (the Mandatory Reporting Rule for Emissions of Greenhouse Gases), where natural gas is ranked as having one of the lowest CO_2 generation rates of any of the fuels listed. Natural gas also has benefits over other fossil fuels from the perspective of other criteria pollutant emissions. The fuel for firing the proposed ovens, boilers, and heaters will be limited to natural gas fuel. Natural gas combustion results in significantly less CO_2 generation per unit of energy when compared to most other fuels.

Energy Efficiency Measures

Roxul will implement unique process improvements with a focus on energy efficiency. For example, the Curing Oven will be well insulated to reduce energy losses to the surroundings. The Curing Oven will use pre-heating chambers to reduce energy requirements and air will be recirculated prior to exiting. Controls will be used for temperature regulation in infrared zones and drying ovens.

Maximizing combustion efficiency reduces the consumption of fuel by optimizing the quantity of usable energy transferred from the fuel to the process. Combustion efficiency is maximized when the combustion zone is provided the best possible mix of fuel and air conditions, such as fuel/air ratio, fuel temperature, combustion air temperature, combustion zone pressure, and heat transfer area.

Good combustion practices are a subset of energy efficiency measures and are a potential control option because they improve the fuel efficiency of the proposed ovens, boilers, and heaters. These practices include:

- Maintaining a proper fuel supply system to minimize fluctuations in fuel quality;
- Ensuring good air/fuel mixing in the combustion zone;
- Monitoring and maintaining a proper operating temperature in the primary combustion zone; and
- Maintaining overall excess O_2 levels high enough to complete combustion while maximizing thermal efficiency.

Good operating and maintenance practices also improve the fuel efficiency of the ovens, boilers, and heaters. These practices include:

- Following documented operating practices recommended by the manufacturer and controlling operating parameters according to manufacturer specifications;
- Implementing documented recommended maintenance and repair guidelines, such as performing preventive maintenance and calibration checks on the fuel flow meters and performing preventive maintenance checks on the O_2 control analyzers; and
- Conducting tune-ups according to manufacturer's specifications to restore optimal high-efficiency, low-emissions performance.

RBLC entries for various combustion sources were reviewed. These entries support a CO_2e emission limit basis of tpy or tpy rolling 12-month. A rolling 12-month basis is appropriate because there is no ambient air quality driver for reducing the averaging period for GHGs.

Step 5 - Selection of BACT

For CO_2e emissions emitted from the natural gas combustion units, BACT is selected to be lower carbon fuel selection (natural gas) and energy efficiency measures, including the implementation of good combustion practices and good operating and maintenance practices. These are the remaining technically and economically feasible control options for minimizing CO_2e emissions associated with the ovens, boilers, and heaters. No adverse energy, environmental, or economic impacts are associated with these control options. Numerical BACT limits for CO_2e emissions are included in Attachment O.

D.9.6 *GHG BACT Determination For Dry Ice Cleaning*

Dry ice pellets will be used for cleaning via blasting onto specialty equipment, for example perforated filters. Emissions from the production of dry ice pellets and cleaning activities via blasting consist of fugitive CO_2.

Step 1 – Identify Potential Control Technologies

The following technologies and innovative processes were identified as potential control measures for CO_2e.

1. Energy Efficiency Measures

Step 2 – Eliminate Technically Infeasible Options

The identified control option is technically feasible.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Energy Efficiency Measures.

Step 4 – Evaluate Remaining Control Technologies

Energy Efficiency Measures

The dry ice cleaning system will be appropriately designed to generate only the amount of CO_2 needed to clean the filter and no more. CO_2 is the most feasible cleaning material because the cooling effect created by the sublimation of the CO_2 pellets hardens the particles of mineral wool clinging to the surface of the filter net. As a result, the reduced resiliency of the particles absorbs less mechanical energy and increases the cleaning efficiency. CO_2 pellet blasting protects the integrity of the filter net. Alternative blasting materials, such as water, are used when possible, whereas CO_2 pellets are used when a more abrasive substance is required to remove particles. The use of CO_2 pellets results in a smaller volume of solid waste for disposal.

Step 5 – Selection of BACT

For CO_2e emissions from dry ice cleaning, BACT is selected to be energy efficiency measures, including the use of CO_2 pellets for cleaning efficiency and waste reduction. No adverse energy, environmental, or economic impacts are associated with this option. Numerical BACT limits for CO_2e emissions from Dry Ice Cleaning are included in Attachment O. A facility-wide rolling 12-month basis is appropriate because there is no ambient air quality driver for reducing the averaging period for GHGs and this source is represents a small fraction of GHG emissions at the facility.

D.9.7 *GHG BACT Determination For Emergency Fire Pump Engine*

This section describes a detailed, step-by-step BACT analysis for control of CO_2e emissions from the proposed firewater pump engine. One 197-hp emergency fire pump engine will be used for the facility's firewater system. The emergency fire pump engine will be a diesel-fuel fired unit and used for emergency purposes only except for periodic readiness and maintenance testing.

CO_2 emissions from the emergency fire pump engine will be produced from the combustion of hydrocarbons present in the diesel fuel. CH_4 emissions result from incomplete combustion of hydrocarbons present in the diesel fuel. N_2O emissions from diesel-fueled unit will be formed as a byproduct of combustion. Potential annual emission rates are based on a maximum operation of 500 hours of operation per year.

Step 1 – Identify Potential Control Technologies

The following technologies were identified as potential control measures for CO_2e emissions associated with the emergency fire pump engine.

1. Lower carbon fuel
2. Energy Efficiency Measures

Step 2 - Eliminate Technically Infeasible Options

Lower Carbon Fuel

While natural gas-fueled fire pump engines may provide lower CO_2e emissions per unit of power output, natural gas is not considered a technically feasible fuel for the emergency fire pump engine since it will be used in the event of a fire, when natural gas supplies may be interrupted. Because the fire pump engine is intended for emergency use, the most technically feasible fuel is diesel fuel.

Step 3 – Rank Remaining Technically Feasible Control Options

1. Energy efficiency measures.

Step 4 – Evaluate Remaining Control Technologies

Compliance with NSPS Subpart IIII is proposed as BACT for CO_2e. Energy efficiency measures, such as good combustion, operating, and maintenance practices for compression ignition engines, include appropriate maintenance of equipment and operating within the recommended air to fuel ratio recommended by the manufacturer. Using good combustion practices, in conjunction with proper maintenance, results in longer life of the equipment and more efficient operation. Therefore, such practices indirectly reduce GHG emissions by supporting operation as designed and with consideration of energy optimization practices. Good combustion practices and good maintenance practices as recommended by the fire pump engine manufacturer will be incorporated to minimize CO_2e emissions and maximize energy efficiency.

Step 5 - Select BACT

For emissions of CO_2e generated by combustion from the emergency fire pump engine, BACT is selected to be implementation of energy efficiency measures, such as good combustion practices and proper maintenance practices. Further, this new engine will be subject to the NSPS for Stationary Compression Ignition Internal Combustion Engines (40 CFR 60 Subpart IIII). Numerical BACT limits for CO_2e emissions are included in Attachment O. A facility-wide rolling 12-month basis is appropriate because there is no ambient air quality driver for reducing the averaging period for GHGs and this source is represents a small fraction of GHG emissions at the facility.

Exhibit J

west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304
Phone 304/926-0475

Austin Caperton, Cabinet Secretary
dep.wv.gov

Pursuant to §45-14-17.2, the Division of Air Quality presents the

PRELIMINARY DETERMINATION/FACT SHEET

for the

CONSTRUCTION

of

ROXUL USA, Inc.'s
RAN Facility

proposed to be located in

Ranson, Jefferson County, WV.

Permit Number: R14-0037
Facility Identification Number: 037-00108

Date: March 8, 2018

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BACKGROUND INFORMATION

Application No.:	R14-0037
Plant ID No.:	037-00108
Applicant:	ROXUL USA, Inc.
Facility Name:	RAN Facility
Location:	Ranson, Jefferson County
SIC/NAICS Code:	3296/327993
Application Type:	Major Source Construction
Received Date:	November 21, 2017
Engineer Assigned:	Joseph R. Kessler, PE
Fee Amount:	$14,500
Date Received:	November 28, 2017
Complete Date:	December 21, 2017
Due Date:	June 19, 2018
Applicant Ad Dates:	November 22, 2017
Newspaper:	*Spirit of Jefferson*
UTM's:	Easting: 252.06 km Northing: 4,362.62 km Zone: 18
Latitude/Longitude:	39.37754/-77.87844
Description:	Construction of a new mineral wool manufacturing facility defined as a major stationary source and subject to Prevention of Significant Deterioration (PSD) permitting requirements.

On November 21, 2017, ROXUL USA, Inc. (ROXUL), a subsidiary of the Rockwool Group, submitted a permit application to construct a new mineral wool manufacturing facility at the "Jefferson Orchards" site in Ranson, Jefferson County, WV. The proposed facility is, pursuant to 45CSR14, Section 2.43, defined as a "major stationary source" and is, therefore, required to undergo PSD review according to the requirements of 45CSR14. Based on DAQ procedure, the permit application will also be concurrently reviewed under the WV minor source program administered under 45CSR13. The proposed annual potential-to-emit (PTE) of the facility in tons per year (TPY) is given in the following table:

Table 1: Facility-Wide Annual PTE

Pollutant	PTE (TPY)	Pollutant	PTE (TPY)
CO	71.40	VOCs	471.41
NO_x	238.96	H_2SO_4	16.37
$PM_{2.5(1)}$	133.41	Lead	2.00e-04
$PM_{10(1)}$	153.19	CO_{2e}	152,934.82
$PM^{(1)}$	250.87	Total HAPs	392.59
SO_2	147.45		

(1) Including condensables.

The following document will outline the DAQ's preliminary determination that the construction of ROXUL's RAN Facility will meet the emission limitations and conditions set forth in the DRAFT permit and will comply with all currently applicable state and federal air quality rules and standards.

PUBLIC REVIEW PROCEDURES

Public review procedures for a new major construction application dual-reviewed under 45CSR13 and 45CSR14 require action items at the time of application submission and at the time a preliminary determination/draft permit is prepared by the DAQ. The following details compliance with the applicable rules and accepted procedures for public notification with respect to permit application R14-0037.

Submission of Confidential Business Information

ROXUL claimed various information submitted in the permit application as Confidential Business Information (CBI). To comply with the requirements of submitting CBI, ROXUL submitted a redacted copy (and subsequently revised such as needed) of the application that does not reveal any of the data claimed CBI. This redacted version of the permit application is the version made available to the public for review (pages with redacted information are appropriately labeled and the information redacted is indicated as a whited out area or, if in tabular form, is noted as "claimed CBI"). Additionally, ROXUL submitted a CBI cover sheet that provides information concerning the submission of CBI including contact information and justification for claims of confidentiality (Attachment Q of the permit application [pp. 428]).

Actions Taken at Application Submission

Pursuant to §45-13-8.3 and §45-14-17.1, ROXUL placed a Class I legal advertisement in the following newspaper on the specified date notifying the public of the submission of a permit application:

- *Spirit of Jefferson* (November 22, 2017).

The DAQ sent a notice of the application submission and a link to the electronic version of the redacted permit application to the following parties:

- The U.S. Environmental Protection Agency (USEPA) Region 3 [§45-14-13.1] - (November 27, 2017);
- The National Park Service [§45-14-13.2] - (November 29, 2017); and
- The US Forest Service [§45-14-13.2] - (November 29, 2017).

The redacted permit application was also made available for review on DAQ's website (electronic version) and at the DAQ Headquarters in Charleston (hard copy).

Actions Taken at Completion of Preliminary Determination

Pursuant to §45-13-8.4 and §45-14-17.4, upon completion (and approval) of the preliminary determination and draft permit, a Class 1 legal advertisement will be placed in the following newspaper stating the DAQ's preliminary determination regarding R14-0037:

- *Spirit of Jefferson*.

Pursuant to §45-13-8.7 and §45-14-13.3, a copy of the preliminary determination, draft permit, and public notice shall be forwarded to USEPA Region 3, the National Park Service (NPS) and the US Forest Service (USFS). A non-confidential copy of the application, complete file, preliminary determination and draft permit shall be available for public review during the public comment period at the DAQ Headquarters in Charleston and on DAQ's website (if unable to download the documents, they will also, by request, either be made available at one location in the region in which the source is proposed to be located or be provided within a reasonable time-frame by contacting the DAQ). Additionally, pursuant to §45-14-17.5, a copy of the public notice will be sent to the mayor of Ranson, WV, the County Clerk of Jefferson County, WV, the Virginia Department of Environmental Quality (VDEQ), and the Maryland Department of the Environment (MDE). All other requests by interested parties for information relating to permit application R14-0037 shall be provided upon request.

Actions Taken at Completion of Final Determination

Pursuant to §45-14-17.7, and 17.8 upon reaching a final determination concerning R14-0037, the DAQ shall prepare a "Final Determination" document make such determination available for review at DAQ Headquarters in Charleston and on DAQ's website (and available to any party upon request).

DESCRIPTION OF PROPOSED FACILITY

Facility Overview

Roxul has proposed to construct and operate a new mineral wool insulation manufacturing facility at the "Jefferson Orchards" site in Ranson, Jefferson County, WV (approximately 5.30 miles southeast of Martinsburg, WV). The proposed facility will consist of a 460,000 ft^2 manufacturing plant situated on an estimated 130 acres. The plant will produce stone wool insulation for building insulation, customized solutions for industrial applications, acoustic ceilings and other applications.

An overview of the processes with the potential to produce air emissions associated with the proposed facility are as follows:

- One Mineral Wool Line including;
    - Raw Material Handling Sources (both raw materials and energy materials);
    - Coal Milling;
    - Melting Furnace Portable Crusher;
    - Melting Furnace;
    - Cooling Towers;
    - Wool Spinning;
    - Binder and De-Dust Oil Application and Storage; and
    - Dry Ice Cleaning (CO_2 emissions only);
    - Fleece Application;
    - Curing and Cooling;
    - Cutting Section;
    - Stacking, Packing and Unit Load; and
    - Recycling Plant.
- One Rockfon Line (ceiling tiles) including cutting and edging operations, paint application, and drying ovens;
- Miscellaneous operations and activities including boilers, heaters, a fire pump engine, and fuel storage; and
- Paved haulroads and mobile work areas.

Detailed Process Description

ROXUL provided a detailed process description in Section 2.0 of the permit application (pps. 8-25). The following detailed process description is taken from Section 2.0 with some summarizing and clarifying as needed by the writer.

Mineral Wool Line

The Mineral Wool Line will produce mineral wool insulation for residential, commercial, and industrial uses and also for off-line production of "Rockfon" ceiling tiles. Various types of insulating products can be produced with different densities, binder content, or dimensions to meet the requirements for various market sectors. Mineral wool (or "stone wool" as it is also referred to) is a natural product made partly from igneous rocks. Rock may be supplemented with recycled mineral wool and slag from the steel industry. The following types of mineral raw materials are typically used in stone wool production:

- Igneous rocks such as basalt/diabase, amphibolite and anorthosite;
- Slags such as blast furnace slag and converter slag;
- Dolomite and/or limestone; and
- Mineral additives, such as olivine sand and high alumina content materials such as bauxite, kaoline clay and aludross (by-product of the smelting process in the creation of aluminum from bauxite).

The mineral wool fibers are made from the stone raw materials (as listed above), binder, and de-dusting oil melted at very high temperatures (>2,700 °F/1,480 °C). The various raw materials used in the melting furnace are mixed in the correct ratio to achieve the required chemistry of the fibers. The manufacturing process consists of the following steps: material handling/charging, melting, spinning, curing, cooling, cutting, and packing. The following will be a more detailed discussion of these processes.

Mineral Wool Line: Raw Material Handling

Raw materials used in the manufacturing process will be delivered in bulk by truck and unloaded and transferred with a front-end loader into a building (B210) with three-sided concrete enclosures covered under a roof (a second similar building may be built in the future and designated B211). The middle of the building where the trucks unload is, however, uncovered. Raw materials may also be delivered to a separate 5,382 ft^2 outdoor stockpile (RMS) within a three-sided enclosure (no roof). From the outdoor storage pile, the material will be transferred to the charging building (B220) or B210/B211 with a front end loader.

From Building B210 or from the RMS, a front-end loader will feed the raw materials into a covered loading hopper (B215). The loading hopper feeds material onto a series of enclosed conveyors (transfer points IMF11 and IMF12 - controlled by a fabric filters IMF11-FF and IMF12-FF, respectively) to the charging building (B220), where all subsequent pre-melting raw material handling activities occur. Emissions from the fully enclosed charging building escape through two non-mechanical, uncontrolled roof vents (IMF17 and IMF18) on the building. The only substantive emissions sources in the charging building are the crusher and screen noted below.

A fraction of oversized raw material is directed, if required, to an indoor screen and crusher. This screen and crusher are each controlled by a fabric filter and vented inside the charging building. Rejected materials are sent to the appropriate partially enclosed reject bins (RM_REJ and S_REJ) that are located outside of the charging building. Ready materials are then distributed to individual raw material bins inside the building. From here, they are measured and dosed onto a belt scale conveyor to create a batch of charge material. The batch is conveyed into a bucket and then loaded into a mixer to create a homogenous charge. The mixer is kept closed and equipped with an add-on filter that vents inside of B220 during mixing.

Belt conveyors then transport the mixed charge to day bins in the furnace building (B300). Transfer points on conveyors are equipped with local de-dusting units that vent indoor or outdoor depending on the location. Transfer points with outdoor vents include IMF14, IMF15, IMF16. Each of these transfer points is controlled with a fabric filter (IMF14-FF, IMF15-FF, and IMF16-FF, respectively). Additionally, there is a vacuum system in Building 220 that is used to manually remove waste material from the floor and vents outside of the building (IMF21) through a fabric filter (IMF21-FF) .

Mineral Wool Line: Coal/Coke Material Handling

Coal (and occasionally petroleum coke - "pet coke"), along with natural gas, is used to provide energy to the Melting Furnace (IMF01). Coal or pet coke, in milled form and ready to use, is delivered to the site by truck and loaded by means of pneumatic transport from the powder transport truck into one of the three (3) outdoor storage silos (IMF03A through IMF03C) - each equipped with bin vent filters (IMF03A-FF through IMF03C-FF, respectively). The coal is transferred from the storage silos to the furnace building (B300) where it is stored in an indoor coal feed tank (IMF25) that is controlled with fabric filter (IMF25-FF).

For substitution of coal or pet coke, secondary combustible materials may sometime be used as an energy source. These include but are not limited to anodes and coke fines. Secondary combustible materials will be delivered to the site by truck and loaded into one of the coal storage silos or into the Filter Fines Day Silo/Secondary Energy Materials Silo (IMF07A, IMF07B - each silo can be used for either material) in the furnace building that are each controlled with a fabric filter (IMF07A-FF and IMF07B-FF, respectively).

Mineral Wool Line: Coal Milling

ROXUL will also have the option of bringing in unmilled coal or pet coke and sizing the material on-site. The coal/pet coke for on-site milling will be delivered in lump size by truck and unloaded at the partially enclosed (three-sided and roofed with a closeable bay door) coal bunker (B230). From the coal bunker the coal is loaded by a front-end loader into the partially enclosed (three-sided and covered) loading hopper (B231). This hopper feeds material onto a series of enclosed conveyors (transfer points IMF13 and IMF04 controlled by fabric filters IMF13-FF and IMF04-FF, respectively) that direct the material to a day bin inside the coal milling building (B235). The material transfer point within the fully enclosed B235 is controlled by a fabric filter and vented inside the building. There is also an uncontrolled transfer point inside B235 from a conveyer to the indoor mill feeding bin. The building B235 vents through a non-mechanical, uncontrolled roof vent on the building.

The milling will be done by a combined vertical coal mill and fluidized bed dryer equipped with a 6.00 mmBtu/hr natural gas-fired direct heating unit (IMF05). The combined exhaust from the dryer heater and the mill will be controlled by a baghouse and exhausted from a stack. Additionally, although not required to be used, dust generated from inside the milling building may be evacuated and sent to the Coal Milling De-Dusting Baghouse (IMF06/IMF06-BH). After milling, coal is pneumatically transported into the three (3) outdoor storage silos that are also used for delivered ready-to-use milled coal (IMF03A through IMF03C).

Mineral Wool Line: Melting Furnace Portable Crusher

Any diverted melt or melt from tapping of the Melting Furnace (large pieces of solid material produced by shutting the furnace down) will be crushed in a portable crusher and reused in the melting process. Prior to crushing, the recycled material will be stored in an approximately 20,000 ft^2 outdoor storage area. ROXUL has stated that this tapped material prior to crushing is of such a physical nature so as to limit any significant generation of fugitive matter from wind erosion and pile activity. From this storage area, the material will be loaded into the portable crusher by an end loader. The portable crusher operation will take place in a dedicated outside area (B170). The uncontrolled 150 tons per hour (TPH) crusher will be brought onsite periodically during the year and will not operate continuously. ROXUL is proposing to limit operation of the crusher to 540 hours per year. Crushed material will be stored in an approximately 19,375 ft^2 three-sided outdoor storage area.

Mineral Wool Line: Melting Operation

In the melting operation, raw materials are combined in a "cupola" - referred to here as the Melting Furnace (IMF01) - to produce the mineral wool strands used in the manufacturing process. During start-up, a 5.10 mmBtu/hr natural gas-fired Preheat Burner (IMF24) is used to warm the Melting Furnace baghouses to prevent condensation. Hot exhaust from the burner will indirectly heat the Melting Furnace baghouses before exhausting through the preheat burner stack. The indirect heat transfer will be done by a thermal oil system including an expansion tank which is used both for preheating transfer of energy and also to extract surplus heat for heat recovery. The Preheat Burner will operate for approximately two hours prior to the Melting Furnace startup. Once to temperature, the coal/pet coke and raw materials will then be added to the furnace to begin the melting process.

The melt process in the Melting Furnace is an oxidizing process, which operates with an excess of oxygen. The furnace has different burners utilizing various fuels (coal, natural gas, and oxygen injection). The burners are comparable to oxy-fuel burners.

The melting process is open to ambient building air with unrestricted air flow (i.e., there is no cover on the furnace). A "quench hood" is situated above the melter that is connected to an exhaust riser. The opening at the top of the melter allows for ambient air to be pulled into the riser, which facilitates an adequate temperature for a de-NO_x reaction to occur (typically 1,400-2,000 °F or 760-1,093 °C). As aqueous ammonia will be injected for a de-NOx reaction to occur, the Melting

Furnace has an "integrated" Selective Non-Catalytic Reduction (SNCR) technology system. Binder contained in the recycled wool can also contribute in the de-NO_x reaction, but is not relied upon for the control of NO_x.

Hot flue gas is used to preheat incoming combustion air to the Melting Furnace via heat exchangers situated at the outlet of the furnace. Flue gas is then directed to a baghouse to collect raw material fines. A second baghouse (IMF01-BH) in series is used for control of emissions of filterable particulate matter and is equipped with sorbent injection to control sulfur dioxide (SO_2), sulfuric acid (H_2SO_4) mist, hydrogen chloride (HCl), and hydrogen fluoride (HF) emissions. Carryover of raw materials fines that are collected in the first baghouse will be pneumatically conveyed to a receiving silo and day silo (Filter Fines Receiving Silo - IMF10, Filter Fines Day Silo - IMF07A) prior to reuse in the Melting Furnace. The silos vent to bin vent filters (IMF10-FF and IMF07A-FF) exhausting to the atmosphere.

As stated, de-sulfurization is applied for the control of sulfur oxides and acid gases in IMF01-BH. Sorbent material (e.g., hydrated lime as calcium hydroxide or similar) is delivered to the site by truck and loaded into an outdoor Sorbent Storage Silo (IMF08) equipped with a bin vent filter (IMF08-FF). Sorbent is transported in a closed system and injected into the flue gas prior to IMF01-BH as a filter media. Spent sorbent is stored in the Spent Sorbent Silo (IMF09) equipped with a bin vent filter (IMF09-FF) until it is emptied into a vacuum truck for off-site disposal.

During Melting Furnace operation, temperatures in the Melting Furnace reach approximately 3,000 °F (1,650 °C) and the resultant melt flows out of the furnace into Gutter Channels that are used to direct melt from the furnace into the Spinning Chamber (SPN). An exhaust is located above the Gutter Channels (GUT-EX) to remove heat from the area so as to lower the temperature in the working environment. This high temperature exhaust will be directed to the Wet Electrostatic Precipitator (WESP - Emission Point HE01).

Once the system is operating at a steady state, waste wool and filter fines from the process are recycled into the Melting Furnace along with stone raw materials. Tapping is an emptying of the furnace, where melt flows directly out of the furnace and into a collection area. The tapped melt can be crushed in the portable crusher and reused in the melting process. Tapping occurs when the line shuts down or as a result of an upset.

Mineral Wool Line: Cooling Towers

The Melting Furnace is cooled with a water jacket (water flow around the furnace in chambers designed to remove excess heat from the furnace). This water is then sent to the 1,321 gallon/min (gpm) Melting Furnace Cooling Tower (IMF02) where a series of heat exchangers will remove heat from the water. The Gutter Channels, which as stated above, are channels that direct melt to the Spinning Chamber, will be water cooled via a 308 gpm recirculating cooling tower (Gutter Cooling

Tower - HE02). Both cooling towers shall be wet-type and will utilize high-efficiency drift eliminators (0.001%) to reduce the escape of water vapor (with entrained particulate matter). Heat recovered from the cooling water systems will be used for building and process heat. Surplus heat will be rejected from the cooling water systems. To that end, a thermal oil system used for heat transfer will be used and require a 2,642 gallon Thermal Oil Tank - IMF (TK-TO3) and a 1,321 gallon Thermal Oil Expansion Tank - IMF (TK-TO4).

Mineral Wool Line: Wool Spinning

The melt flows out of the lower part of the furnace and is led to the Spinning Chamber (SPN) via the Gutter Channels. The Spinning Chamber is equipped with quick-rotating wheels onto which the melt is applied. The fibers are drawn from the wheels of the spinning machine by centrifugation combined with a powerful air stream that is blown into the Spinning Chamber. At the same time, a binding agent (to provide structural rigidity) and cooling water is added to the flow of fibers. Also, the material is sprayed with de-dusting oil to give it water-repellent properties and to reduce dust emissions in the factory from the finished products. Binder and water are dosed as small droplets through nozzles on the spinning machine. Fibers not recovered in the spinning process are directed to the Recycle Plant for re-use in the furnace. The binder-coated fibers are collected on a perforated surface (filter net). The fibers settle on the surface as a primary wool web, and air is sucked through the perforation by means of negative pressure in the chamber in a vertical direction. Exhaust from the Spinning Chamber will conditioned (e.g. with quenching or water spraying) prior to being sent to the WESP for control (Emission Point HE01).

Mineral Wool Line: Binder and De-Dust Oil Application and Storage

Binders will be mixed onsite, either as a batch or by in-line mixing. The binder raw materials (resin and other binder components) are delivered to the site via tank truck and unloaded into a series of 15,850 gallon storage tanks (resin tanks: TK-RS1 through TK-RS7) or delivered in drums/totes. The binder storage area consists of a series of tanks in a tank farm which is covered with a sheet roof but has no walls. The materials may be stored in temperature-controlled tanks equipped with heating and cooling as required. From the storage tanks, the components are either mixed as a batch in a mixing tank, or mixed in-line. Binder mixed in the 2,642 gallon Binder Mix Tank (TK-BM) is pumped to the 4,227 gallon Binder Circulating Tank (TK-BC) and from here to the 793 gallon Binder Day Tank (TK-BD) in the Furnace Building.

A separate 15,850 gallon De-dust Oil Storage Tank (TK-DO) is used for the de-dusting oil due to fire requirements. De-dusting oil is delivered in bulk by truck or in drums or in an intermediate bulk container (IBC) and unloaded into this storage tank. From TK-DO, the oil is pumped into a De-dust Oil Day Storage Tank (TK-DOD) in the furnace building and from there dosed into the spinning and wool collection process. The standard binder is a urea-modified phenolic resin which is cured during the mineral wool curing and cooling process. ROXUL proposes to use varying binder formulations as technology advances to produce formaldehyde-free resins.

Mineral Wool Line: Dry Ice Cleaning

For mineral wool products where product quality requirements necessitate additional cleaning of the perforated filter net, dry ice will be applied for cleaning. Dry ice pellets will be used for cleaning via blasting them onto the perforated filter net. A pressurized storage tank will feed liquid CO_2 to a pelletizer unit which will form dry ice pellets (solid CO_2). The system (DI) continuously produces dry ice pellets which are fed to a blasting gun that directs the pellets (165.3 lb/hr) to the perforated filter net. Emissions from the production of dry ice pellets and the cleaning activities consist only of fugitive CO_2.

Mineral Wool Line: Fleece Application

Fleece application stations will be added to the line prior to the Curing Oven for use in specialty products. Rolls of fleece (fiberglass or similar facing) will be situated at two unrolling stations, above and below the mineral wool conveyor. Each upper and lower fleece layer will be unrolled as a continuous sheet and directed via rollers through an open dip "bath" of binder. Each dip bath will coat one side of the upper and lower fleece with binder. The coated fleece will be directed towards the top and underside of the uncured mineral wool via rollers and placed onto the surface of the uncured wool just prior to entry into the Curing Oven (CO), where binder in the wool and on the fleece will be cured. Binder will be fed to the dip baths via enclosed piping from the Binder Day Tank or from the approximately 264 gal Binder Storage Containers (TK-BS1 through TK-BS3). The binder coating may be the same binder that is applied in the Spinning Chamber, or it can be a special binder.

Emissions from Fleece Application will consist of fugitive VOC and organic HAP emissions resulting from surface evaporation of binder in the dip tank and binder-coated fleece just prior to the Curing Oven (CM12 and CM13). The majority of emissions from the binder applied to the fleece will be controlled by the Curing Oven afterburner as the fleece is cured onto the wet mineral wool in the Curing Oven.

Mineral Wool Line: Curing and Cooling

The wool web is conveyed to a "pendulum" which, by swinging the wool back and forth, arranges multiple layers of wool onto the wool lane. For some products the edges will be cut along the wool lane by means of a mechanical saw before the curing oven. The removed edges, which are uncured wool (wet wool), are sent to the Recycle Plant via conveyors. The wool lane is then conveyed into the Curing Oven (CO), where the remaining water in the product is evaporated and the binder is cured by means of hot air supplied from two natural gas-fired circulation burners (via direct heating). A 6.83 mmBtu/hr natural gas-fired Afterburner (CO-AB) controls CO, VOC, and organic HAP emissions emitted from the Curing Process. Exhaust from the Afterburner is directed to the WESP (Emission Point HE01) for further control.

Additionally, the Curing Oven is equipped with hoods at the inlet and outlet (CO-HD) to control the working environment in the event that hot air escapes the curing oven due to system pressure changes. Vapors from these hoods are also directed to the WESP (Emission Point HE01) for control.

After leaving the Curing Oven, the wool web is conveyed through a Cooling Section (CS) where ambient air (from the production hall) is sucked through the cured wool web to cool it prior to cutting. Emissions from the Cooling Section consist of particulate matter, VOC, organic HAPs (formaldehyde, methanol, phenol), and small amounts of NO_x and CO. Vapors from the Cooling Section are directed to the WESP (Emission Point HE01) for control.

Mineral Wool Line: Cutting Section

After the cooling zone, the cured wool web is labeled with product features and cut to size by a water jet and/or mechanical cutting. Edges may be trimmed prior to labeling and transported to the Recycle plant via the line granulator. Labels can be branded to the product in three different ways:

- Branding wheels (P_MARK) fired by natural gas combustion (combined maximum aggregated burner capacity is 0.4 mmBtu/hr);
- Laser marking; or
- Inkjet labeling.

Emissions from the natural gas combustion used for the Branding Wheels vent in the production building and consist only of combustion exhaust. Emissions from inkjet labeling consists of VOC emissions from evaporation of organics in the ink and cleaner applied. The ink and cleaner are HAP-free. These emissions also occur indoor and are fugitive in nature. Dust from the mechanical saws is removed pneumatically and directed to the De-dusting Baghouse (CE01). The collected dust/filter material is transported via closed conveyors to the Recycle Plant. There are no air emissions associated with the use of laser marking or waterjet cutting.

Mineral Wool Line: Stacking, Packing and Unit Load

After cutting the products are stacked, packaged in polyethylene film, palletized (as needed), and transported to one of the storage areas for finished goods. A paper surface may be applied to products either before final cutting or after they are cut to size. The paper applied is a pre-coated polyethylene (PE) paper which is warmed in electrically heated drums so that the paper adheres to the wool product. Dispatch of finished goods in to trucks takes place from the unit load area. Vacuum cleaning of the packing warehouse area (CE02) is controlled by the Vacuum Cleaning Baghouse (CE02-BH).

Mineral Wool Line: Recycling Plant

The Recycle Plant is used to recover materials (e.g., waste wool and de-dusting fines such as fibers and dust) from the mineral wool manufacturing line that would otherwise be sent to a landfill for disposal. The Recycling Plant can also receive mineral wool products returned from ROXUL customers, such as products damaged in shipping, wool waste products from construction sites or

directly from customers with the purpose to recover the material for new products. The Recycle Plant process includes material handling by end-loaders and conveyors, milling, and batching. All material handling in the recycling process is done inside a closed building that utilizes a fast roller gate controlled by the movement of the end loader. The building is equipped with roof exhaust vents (CM08 through CM11) equipped with particulate filters (CM08-FF through CM11-FF) to control the particulate emissions and to remove ammonia odor and the end-loader exhaust gases for industrial hygiene purposes. Additionally, the recyclable materials mill hopper is connected to the De-dusting Baghouse (CE01-BH) - which is also used to control emissions from the wool line cutting area.

Rockfon Line

The Rockfon Line will produce ceiling tiles using the mineral wool slabs produced on the Mineral Wool Line and take place at a separate area of the plant site in Building 700. The process will include cutting, sanding, glue application, hot pressing, curing, paint application, drying, and packaging.

The mineral wool slabs will first be split by a saw and go through a sanding machine to ensure proper dimension. Particulate matter emissions from the cutting and sanding operations will be captured and directed to the Rockfon De-Dusting Baghouse (RFNE8-BH). Next, the mineral wool slabs will be directed through a glue cabinet for application under Infrared Light (RFNE1) of an adhesive and a fleece layer. The slabs will then be compressed under a hot press (RFNE2). Emissions from RFNE1 and RFNE2 are uncontrolled and are vented outside the building. Additional formatting and cutting then occurs with particulate matter emissions again being controlled by Rockfon De-Dusting Baghouse.

The raw ceiling tiles then undergo several rounds of paint application and edging to form the desired product. Paint is dried in five (5) different natural gas-fired ovens. All paints used in the Rockfon Line will be water-based. Specifications are a for maximum of 0.67 lb VOC/gal for any individual paint. The Spray Paint Cabin (RFNE5), and emissions from the 2.05 and 4.78 mmBtu/hr Drying Ovens will be controlled by fabric filters (RFNE5-FF, RFNE4-FF and RFNE6-FF, respectively). Emissions from the 2.73 mmBtu/hr High Ovens A and B (RFN3 and RFN9) are uncontrolled. After cooling in the Cooling Zone (RFNE7), the board tiles are then stacked, wrapped, and palletized for shipment.

An electrically heated thermal oil system used for heat transfer in the Rockfon process will be connected to a 212 gallon Thermal Expansion Tank (TK-TO1) to compensate for the changing volume of thermal oil in the system and a 159 gallon Thermal Oil Drain Tank (TK-TO2) to facilitate system oil changes.

Miscellaneous Operations and Activities

Building heat for the melting and Rockfom manufacturing areas will be supplied by three (3) 5.1 mmBtu/hr natural gas-fired boilers: Natural Gas Boiler 1 and 2 (CM03 and CM04) and Rockfon Building Heater (RFN10). ROXUL plans to install two emergency fire pumps that will be used to pump water in the event of a fire. One pump will be diesel driven (in case of power failure) and one pump is electrically powered. The diesel engine (EFP1) shall have a maximum rating of 147

kW_m/197 horsepower (hp). Additional storage tanks will be used for Diesel Fuel (TK-DF - 2,642 gallons) and Used Oil (TK-UO - Used Oil Tank).

The proposed ROXUL facility will also include a proposed Oxygen Plant (not built initially but at a later date) for dosing to the Melting Furnaces to ensure oxygen enrichment. The oxygen plant will emit primarily nitrogen and argon and is not a source of air pollutants.

SITE INSPECTION

On February 15, 2018, the writer conducted an inspection of the proposed location of the ROXUL's RAN Facility. The proposed site is located at the "Jefferson Orchards" site in Ranson, Jefferson County, WV approximately 5.30 miles southeast of Martinsburg, WV. The writer was accompanied on the inspection by Mr. Grant Morgan of ERM (consultant), and Ms. Mette Drejstel and Mr. Ken Cammarato of ROXUL. Observations from the inspection include:

- The proposed location of the facility is at the old "Jefferson Orchards" site just southeast of Kearneysville, WV: an incorporated community located at the intersection of State Route (SR) 9 and SR 480. The proposed site, however, is located within the incorporated city limits of Ranson, WV (the center of which is located approximately 5.63 miles to the south-southeast);

- The topography of the proposed location is gentle rolling hills with a mix of scattered communities, farms, highways and more concentrated urban areas with a radius of seven (7) miles. The proposed site is bounded (1) immediately to the south by SR 9 and further south by a small unincorporated community, (2) to the east by fields associated with the Jefferson Orchards site and subject to further development, (3) to the north by a privately owned area of fields, and (4) to the west by several residential properties, a private hunting/fishing club, and further west by County Route (CR) 48/3 (Stubbs Road). North Jefferson Elementary School is located approximately 0.40 miles to the south;

- The proposed site sits in a slight topographical bowl with a railroad grade and a tree line to the south which would be expected to somewhat mitigate the visibility of the facility from the south along SR 9;

- At the time of the inspection, a small trailer serving as a field office had been put in place and general landscaping work had begun. No construction of any permanent foundation work or similar activity was seen; and

- The occupied residences located nearest to the proposed site are immediately to the east of the facility along Granny Smith Lane.

Directions: [Latitude/Longitude: 39.37754/-77.87844] From the Interstate 81 - SR45/SR9 intersection, travel on SR45/SR9 east for approximately 6.6 miles and take the Kearneysville/Leetown exit on the right. At the base of the exit ramp, turn right onto Leetown Road (CR 1) and travel for about 0.4 miles and turn left onto Border Road (CR 1/2) and go for 0.8 miles

and turn left onto Northport Avenue. Travel on Northport Avenue up and over SR 9 bridge until reaching the proposed facility access road.

AIR EMISSIONS AND CALCULATION METHODOLOGIES

ROXUL included as Appendix A in the permit application (pps. 63-86) detailed air emissions calculations for the proposed RAN Facility. The following will summarize the calculation methodologies used by ROXUL to calculate the PTE of the proposed facility. See Appendix A in the permit application for the complete PTE calculations.

Material Handling

Emissions of particulate matter may occur from the unloading, transporting, conveying, screening, crushing, and storing of raw, recycled, and energy materials used in the mineral wool production process. Additionally, particulate matter emissions may occur as a result of the cutting, shaping, and transporting of both the mineral wool and the Rockfon products. Where emission sources (silos, enclosed conveyer transfer points, crushing, etc.) are controlled by fabric filters/baghouses, the filterable particulate matter emission estimate for the controlled source was based on the maximum outlet concentration of the filter. For uncontrolled emission sources, or where controlled through the use of enclosures, emissions were calculated using the appropriate section of AP-42 (AP-42 is a database of emission factors maintained by USEPA). Controlled emissions were then calculated using a reasonable control efficiency based on the type of enclosure or other mitigating factor. See the following table for the source of various material handling emission factors used by ROXUL:

Table 2: Material Handling PM Emission Factor Sources

Emission Source	Emission Factor Source	Notes
End-loader/Dump Truck Drops	AP-42, Section 13.2.4 (11/06)	Emission factor calculation includes material moisture content and average wind speed.
Conveyer Transfer Points		
Melt Furnace Portable Crusher	AP-42, Table 11.19.2-2 (8/04)	Based on Tertiary Crushing Factors
Open Storage	WV G-40B General Permit Guidance	G-40B Guidance based on emission factor given in Air Pollution Engineering Manual © 1992 pp. 136 & References.
Paved Haulroads & Mobile Work Areas	AP-42 Section 13.2.1 (1/11)	Based on average truck weights, surface material silt content, and number of precipitation days. A control percentage of 75% was used for vacuum sweeping.
Sources Controlled by Fabric Filters	Maximum Outlet Loading Concentration(1)	Calculated with maximum outward airflow.

(1) As based on vendor information or vendor guarantees

Where sources of emissions occurred inside a building with exhaust vents controlled by particulate matter filters, the emission estimate for the building was based on the worst-case outlet particulate mater concentration of the filter. Where there was only uncontrolled general exhaust fans on a building, the emissions estimated from the building were the aggregated emissions of the individual emission units in the building.

If based on AP-42 emission factors, all hourly emissions were based on the worst-case hourly throughput (either as limited by the bottlenecked process or by the capacity of the unit) and, unless otherwise noted, annual emissions were based on 8,760 hours a year of operation. Hourly emissions from the fabric filters/baghouses were based on the maximum expected airflow through the units and, unless otherwise noted, annual emissions were based on 8,760 hours a year of operation. Where appropriate, ROXUL adjusted the emission rates of PM_{10} and $PM_{2.5}$ as based on appropriate particle size distribution.

Coal Milling & Drying

The process of milling unsized coal ("lump" coal) for use in the Melting Furnace will include material handling emission sources (covered above) and air emissions from the combined vertical coal mill and fluidized bed dryer that is equipped with a 6.00 mmBtu/hr natural gas-fired direct heating unit. The combustion exhaust of the heating unit is used to directly dry the coal in the fluidized bed dryer. The combined exhaust from the dryer heater and the mill will be controlled by a baghouse (IMF05-BH) and exhausted from a stack (IMF05). This operation has the potential to generate the products of combustion from the heating unit and VOCs and particulate matter from the fluidized dryer. Emission factors for the natural gas-fired heating unit combustion exhaust were taken from manufacturer's data (NO_x), AP-42, Section 1.4., and 40 CFR 98, Table A-1 (CO_2e). ROXUL has claimed the source of the VOC and particulate matter emission factors for the coal mill fluidized bed dryer as CBI. The hourly emissions are based on the maximum amount of coal that can de delivered to the facility in a day (as averaged over a 24 hour day) and annual emissions were based on the maximum daily throughput and 365 days of operation per year.

Melting Operation

Emissions from the Melting Furnace (IMF01), which includes both the products of combustion and various VOC and PM Hazardous Air Pollutants (VOC-HAPs and PM-HAPs), as controlled by the inherent SNCR and Oxy-fuel burners (NO_x), Fines Collection Filter and a Baghouse (PM and with Sorbent Injection for SO_2/organic acids control) was based primarily from, as stated in the permit application, "stack testing from [a] similar facility, scaled as appropriate to RAN process." ROXUL has claimed the source of the emission factors for filterable PM, HF, HCl, and GHGs and as CBI. Hourly emissions from the Melting Furnace were based on the maximum capacity of the Melting Furnace and annual emissions were based on 8,760 hours a year of operation.

Wool Spinning

Emissions from the Spinning Chamber, which includes particulate matter, VOCs, and VOC-HAPs, as controlled by the WESP, was based primarily from, as stated in the permit application,

"stack testing from [a] similar facility, scaled as appropriate to RAN process." VOCs are emitted from the use of the binder and de-dusting oils applied in the wool spinning chamber. The emissions of some HAPs (phenol, formaldehyde, and methanol) from the spinning chamber are combined with those emitted during curing (but not cooling) operations and the basis for these emissions has been claimed as CBI by Roxul. Emissions from the spinning chamber are combined with the gutter exhaust, and emissions from the curing and cooling operations before being sent for control by the WESP and emitted from emission point HE01. Hourly emissions from the Spinning Chamber were based on the maximum capacity of the Melting Furnace and annual emissions were based on 8,760 hours a year of operation.

Curing and Cooling

Emissions from the Curing Oven, Curing Oven Hoods, Gutter Exhaust, and the Cooling Section, which includes the products of combustion, particulate matter, VOCs, and VOC-HAPs, as controlled by the afterburner (CO and organics) and the WESP (particulate matter), were based primarily from, as stated in the permit application, "stack testing from [a] similar facility, scaled as appropriate to RAN process." VOCs are emitted from the curing and evaporation of the binder and de-dusting oils applied in the wool spinning chamber. Emissions from the curing and cooling operations are first sent to the afterburner and then combined with the gutter exhaust, and emissions from the spinning chamber before being sent for control by the WESP and emitted from emission point HE01. Hourly emissions from the Curing and Cooling process were based on the maximum capacity of the Melting Furnace and annual emissions were based on 8,760 hours a year of operation.

Fleece Application

Uncontrolled emissions of VOCs and VOC-HAPs were based on the maximum limited VOC content of the binder (0.016 kg-VOC/kg-binder as limited under 40 CFR §63.3370(a)(2)(i)) used in the application of fleece. Hourly emissions were based on a maximum of 185 kg/hr of binder used and annual emissions were based on 8,760 hours a year of operation. While it is expected that most of the VOCs emitted from the application of fleece will occur during the curing process and be controlled by the afterburner, to be conservative, ROXUL did not apply any control percentage to the emissions from fleece application.

Dry Ice Cleaning

Emissions of CO_2 - defined as a GHG - occur during the production and use of dry ice (frozen CO_2 pellets) as it sublimates into the atmosphere. The emissions were calculated using a mass balance approach that assumes all dry ice produced is emitted into the atmosphere as CO_2. This calculation assumes a dry ice cleaning rate of 75 kg/hr (~165 lb/hr) plus an additional loss rate of 2.2 (this factor is based on vendor information). Annual emissions were based on the dry ice cleaning operations operating 8,760 hours per year (although the actual operations of dry ice cleaning are intermittent as the equipment will traverse from one end of the equipment to the other when cleaning and dry ice pellets are used only when in forward movement).

Product Marking

Emissions from inkjet labeling consists of VOC emissions from evaporation of organics in the ink and cleaner applied. The ink and cleaner are HAP-free. These emissions occur indoor and are fugitive in nature. ROXUL assumed in the calculations that the inks and cleaner were 100% VOCs and that all VOCs evaporated in the product marking process. Annual emissions were based on usage of 2,400 gallons of ink (7.58 lb/gallon) and 100 gallons of cleaner (7.51 lb/gallon) per year. The writer calculated the hourly emissions from the product marking operations based on 8,760 hours of operations per year.

Cooling Towers

Particulate matter emissions from the Melting Furnace and Gutter Cooling Towers (IMF02 and HE02, respectively) occur because the wet-type cooling towers provide direct contact between the cooling water and the air passing through the tower. Some of the liquid water may be entrained within the air stream and carried out of the tower as "drift" droplets. Therefore, the particulate constituent (suspended and dissolved solids) of the drift droplets may be classified as particulate matter. ROXUL calculated the potential emissions from the cooling towers based expected worst-case total dissolved solids (TDS - 1,500 ppm) in the cooling water, the maximum amounts of make-up water used in the melting Furnace and Gutter Cooling Towers (1,321 and 308 gpm, respectively), and the estimated maximum drift rate (0.001% based on the use of the high-efficiency drift eliminators) of the plume. Annual emissions from the cooling towers are based on operations of 8,760 hours per year.

Natural Gas Combustion Exhaust Emissions

Various process heaters, ovens, and boilers (IMF24, RFNE3, RFNE4, RFNE6, RFNE9, RFN10, CM03, CM04, and the Afterburner) will combust pipeline-quality natural gas (PNG). Combustion emissions from these units were based on the emission factors provided for natural gas combustion as given in AP-42 Section 1.4., 40 CFR 98, Table A-1 (CO_2e), and, where stated, on vendor data. Maximum hourly emissions were based on the maximum design heat input (MDHI) of the units and a natural gas heat content value of 1,026 Btu/ft^3 was used in the calculations. Annua emissions from these units were based on operation of 8,760 hours per year.

Rockfon Line Glue/Paint Application & Curing

In addition to material handling emissions and the products of combustion from process heating/drying discussed above, emissions from the Rockfon Line are generated from the application of glue and paint. ROXUL based the VOC emissions from the Rockfon Line on the worst-case VOC contents of the paints and glue used on the line and maximum expected usage numbers. All paints used in the Rockfon Line will be water-based and specifications are a for maximum of 0.67 lb VOC/gal for any individual paint (no HAP-containing paints or glue will be used in the Rockfon Line). Additionally, particulate matter generated while in the Drying Ovens (RFNE4 and RFNE6) and the Spray Paint Cabin (RFNE5) will be controlled by fabric filters (RFNE4-FF, RFNE5-FF, and RFNE6-FF) the emissions based on the worst-case outlet loading concentration and maximum air-flow in the same manner of other fabric filters. Annual emissions from the application of glue/paint in the Rockfon Line are based on the worst-case paint/glue annual usage numbers.

There will be a small amount of additional phenol and formaldehyde HAP emissions emanating from the binder used in the mineral wool manufacturing process that will volatilize during the curing and drying process of the Rockfon Line. These emissions were based on "stack testing from [a] similar facility, scaled as appropriate to RAN process."

ROXUL conservatively estimated that all filterable particulate matter generated in the Rockfon Line was mineral fiber, a PM-HAP.

Storage Tanks

ROXUL provided an estimate of the uncontrolled emissions produced from each fixed roof storage tank with the potential to emit substantive amounts of VOCs/HAPs using the TANKS 4.09d program as provided under AP-42, Section 7. The total emissions from each fixed roof storage tank are the combination of the calculated "breathing loss" and "working loss." The breathing loss refers to the loss of vapors as a result of tank vapor space breathing (resulting from temperature and pressure differences) that occurs continuously when the tank is storing liquid. The working loss refers to the loss of vapors as a result of tank filling or emptying operations. Breathing losses are independent of storage tank throughput while working losses are dependent on throughput. The tanks that are temperature controlled were assumed to have no breathing losses. The facility will utilize other small storage vessels that are either filled with container contents prior to delivery to the site and maintained closed or do not have quantifiable emissions. Annual emissions were as calculated by the TANKS program and based on tank-specific data (including the properties of the materials stored) and the specific maximum throughputs of each tank.

Emergency Fire Pump Engine

Potential emissions from the 197 hp diesel-fired Emergency Generator (EFP1) were based on the appropriate limits as given under 40 CFR 60, Subpart IIII (filterable particulate matter, CO, NO_x, VOCs), emission factors obtained from AP-42, Section 3.4 (condensable particulate matter, total HAPs), mass balance equations (SO_2), and 40 CFR 98, Table A-1 (CO_2e). Ultra-Low Sulfur Diesel with a maximum sulfur content of 0.0015% was used in the calculation of SO_2. Hourly emissions were based on the rated horsepower of the unit and annual emissions were based on 500 hours per year of non-emergency operation.

Emissions Summary

Based on the above estimation methodology as submitted in Appendix A of the permit application, the facility-wide PTE of the proposed RAN Facility is given in Attachment A to this preliminary determination.

REGULATORY APPLICABILITY

The proposed RAN Facility is subject to substantive requirements in the following state and federal air quality rules and regulations:

Table 3: Applicable State and Federal Air Quality Rules

State Air Quality Rules	
Emissions Standards	
45CSR2	To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers
45CSR6	To Prevent and Control Particulate Air Pollution from Combustion of Refuse
45CSR7	To Prevent and Control Particulate Air Pollution from Manufacturing Process Operations
45CSR10	To Prevent and Control Air Pollution from the Emission of Sulfur Oxides
Permitting Programs and Administrative Rules	
45CSR13	Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation
45CSR14	Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration
45CSR30	Requirements for Operating Permits
Federal Air Quality Rules	
New Source Performance Standards (NSPS) - 40 CFR 60	
Subpart OOO	Standards of Performance for Nonmetallic Mineral Processing Plants
Subpart IIII	Standards of Performance for Stationary Compression Ignition Internal Combustion Engines
Maximum Achievable Control Technology (MACT) - 40 CFR 63	
Subpart DDD	National Emission Standards for Hazardous Air Pollutants for Mineral Wool Production
Subpart JJJJ	National Emission Standard for Hazardous Air Pollutants: Paper and Other Web Coating
Subpart ZZZZ	National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines
Subpart DDDDD	National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters

Each applicable rule (and any rule with questionable non-applicability) and ROXUL's proposed compliance therewith will be summarized below. ROXUL submitted a detailed regulatory applicability discussion as Section 4.0 (Federal Requirements) and 5.0 (State Requirements) in the permit application (pps. 28-49).

WV State Air Quality Rules

45CSR2: To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers

Pursuant to the definition of "fuel burning unit" under 45CSR2 ("producing heat or power by *indirect heat transfer*"), 45CSR2 will apply to the proposed PreHeat Burner (IMF24), Natural Gas Boilers 1 and 2 (CM03 and CM04), and the Rockfon Building Heater (RFN10) and these units are, therefore, subject to the applicable requirements therein. However, pursuant to the exemption given under §45-2-11, as the MDHI of each of the units is less than 10 mmBtu/hr, the units are not subject to sections 4, 5, 6, 8 and 9 of 45CSR2. The only remaining substantive requirement is under Section 3.1 - Visible Emissions Standards.

45CSR2 Opacity Standard - Section 3.1

Pursuant to 45CSR2, Section 3.1, each of the above specified units are subject to an opacity limit of 10%. Proper maintenance and operation of the units (and the use of PNG as fuel) should keep the opacity of the units well below 10% during normal operations.

45CSR5: To Prevent and Control Air Pollution from Coal Preparation Plants, Coal Handling Operations, and Coal Refuse Disposal Operations (Non-Applicable)

The coal handling and milling operations at the proposed facility are, pursuant to §45-5-2.4 and §45-5-2.14, not subject to the requirements under 45CSR5 as the plant is a manufacturing facility subject to the requirements under 45CSR7. Additionally, it is noted that, pursuant to §45-5-2.4, the coal handling and milling operations would not be defined as a "coal preparation plant" as the design capacity of the operations is less than 200 tons per day.

45CSR6: To Prevent and Control Particulate Air Pollution from Combustion of Refuse

ROXUL has proposed the use of an afterburner for control of vapors captured from the curing ovens (see above). The afterburner meets the definition of an "incinerator" under 45CSR6 and is, therefore, subject to the requirements therein. The substantive requirements applicable to the afterburner are discussed below.

45CSR6 Emission Standards for Incinerators - Section 4.1

Pursuant to §45-6-4.1, PM emissions from incinerators are limited to a value determined by the following formula:

Emissions (lb/hr) = F x Incinerator Capacity (tons/hr)

Where, the factor, F, is as indicated in Table I below:

Table I: Factor, F, for Determining Maximum Allowable Particulate Emissions

Incinerator Capacity	Factor F
A. Less than 15,000 lbs/hr	5.43
B. 15,000 lbs/hr or greater	2.72

ROXUL calculated the maximum capacity of the afterburner to be 24.4 tons/hour. Using this value in the above equation produces a PM emission limit of 66.37 lbs/hr. ROXUL estimated that up to a worst-case of 3.31 lbs/hour of particulate matter emissions could be from the afterburner (with an aggregate total of 21.21 lbs/hr emitted from the WESP). This is far below the 45CSR6 limit.

45CSR6 Opacity Limits for - Section 4.3, 4.4

Pursuant to §45-6-4.3, and subject to the exemptions under 4.4, the afterburner will have a 20% limit on opacity during operation. Proper design and operation of the afterburner should prevent any substantive opacity from the unit.

45CSR7: To Prevent and Control Particulate Air Pollution from Manufacturing Process Operations

45CSR7 has requirements to prevent and control particulate matter air pollution from manufacturing processes and associated operations. Pursuant to §45-7-2.20, a "manufacturing process" means "any action, operation or treatment, embracing chemical, industrial or manufacturing efforts . . . that may emit smoke, particulate matter or gaseous matter." 45CSR7 has three substantive requirements potentially applicable to the particulate matter-emitting operations at the RAN Facility. These are the opacity requirements under Section 3, the mass emission standards under Section 4, and the fugitive emission standards under Section 5. Each of these sections will be discussed below.

45CSR7 Opacity Standards - Section 3

§45-7-3.1 sets an opacity limit of 20% on all "process source operations." Pursuant to §45-6-2.38, a "source operation" means the last operation in a manufacturing process preceding the emission of air contaminants [in] which [the] operation results in the separation of air contaminants from the process materials or in the conversion of the process materials into air contaminants and is not an air pollution abatement operation." This language would define all particulate matter emitting sources as "source operations" under 45CSR7 and, therefore, these sources would be subject to the opacity limit [after control]. Based on the ROXUL's proposed use of BACT-level particulate matter controls [such as baghouses, fabric filters, enclosures, etc.], these measures should, if maintained and operated correctly, allow the particulate matter emitting sources to operate in compliance with the 20% opacity limit.

45CSR7 Weight Emission Standards - Section 4

§45-7-4.1 requires that each manufacturing process source operation or duplicate source operation meet a maximum allowable "stack" particulate matter limit based on the weight of material

processed through the source operation. As the limit is defined as a "stack" limit (under Table 45-7A), the only applicable emission units (defined as a type 'a' sources) are those that are non-fugitive in nature. The particulate matter limits given under 45CSR7 only address filterable particulate matter.

Due to the large process weight-rates used in the production of mineral wool and the BACT-level particulate matter controls on particulate matter-emitting units, it is reasonable to assume that the Table 45-7A limits will be easily met. ROXUL, however, to be conservative and to address any duplicate-source issues, divided the facility into four sections for 45CSR7 compliance demonstration: Mineral Wool Line, Rockfon Line, Coal Milling, and Material Handling. They then used the process weight rate (PWR) of each line to determine what the aggregate Table 45-7A particulate matter limit would be. This analysis showed that the aggregate particulate matter emissions from each section was in compliance with the calculated emission limit.

This method is very conservative as 45CSR7 allows the use of the PWR on an emissions-unit basis to calculate the particulate matter limit for that specific emissions unit. As most processes are serial in nature, the aggregate limit (or a value near to it) would apply in most cases on an individual emission-unit basis and not on the aggregate emissions of a group of emission units. Therefore, using the line PWR to determine an aggregate emission limit is considered a reasonable (and very conservative) methodology to determine §45-7-4.1 compliance with a large number of particulate matter sources.

§45-7-4.2 requires that mineral acids shall not be released from manufacturing process source operation or duplicate source operation in excess of the quantity given in Table 45-7B. While it was appropriate to conservatively classify all the particulate matter generating source operations as type 'a' above, the generation of mineral acids only occurs in the Melting Furnace through the combustion of coal/pet coke and the melting of slag and other mineral feedstocks. For this reason, the Melting Furnace is appropriately defined as a type 'd' source (*"type 'd' means any manufacturing process source operation in which materials of any origin undergo a chemical change, and this chemical change results in the emission of particulate matter to the atmosphere"*). The unit has potential emissions of sulfuric acid and hydrochloric acid, both which are regulated under Table 45-7B. The limit for type 'd' sources is: H_2SO_4 - 70 mg/m^3, HCl - 420 mg/m^3. The proposed emission rates of H_2SO_4 and HCl from the Melting Furnace are 50 and 3.9 mg/m^3, respectively. The proposed emission rates are in compliance with the Table 45-7B limits.

45CSR7 Fugitive Emissions - Section 5

Pursuant to §45-7-5.1 and 5.2, each manufacturing process or storage structure generating fugitive particulate matter must include a system to minimize the emissions of fugitive particulate matter. The use of various BACT-level controls (where reasonable) on material transfer points, the use of a vacuum sweeper truck on the haulroads, and the management of on-storage pile activity is considered a reasonable system of minimizing the emissions of fugitive particulate matter at the proposed facility.

45CSR10: To Prevent and Control Air Pollution from the Emission of Sulfur Oxides

45CSR10 has requirements limiting SO_2 emissions from "fuel burning units," limiting in-stack SO_2 concentrations of "manufacturing processes," and limiting hydrogen sulfide (H_2S) concentrations in process gas streams. The proposed PreHeat Burner (IMF24), Natural Gas Boilers 1 and 2 (CM03 and CM04), and the Rockfon Building Heater (RFN10) are each defined as fuel burning units ("producing heat or power by *indirect heat transfer*"). However, pursuant to the exemption given under §45-10-10.1, as the MDHI of each of these units is less than 10 mmBtu/hr, these units are not subject to the limitations on fuel burning units under 45CSR10. The proposed ROXUL facility does not combust any process gas streams that potentially contain H_2S.

However, the Melting Furnace stack, after control by the sorbent injection system, will be subject to the limitation on in-stack SO_2 concentrations. Pursuant to §45-10-4.1, the Melting Furnace stack (IMF01) shall not exceed "an in-stack sulfur dioxide concentration [of] 2,000 parts per million by volume." Based on information submitted by ROXUL (IMF01: 33.63 lb-SO_2/hr, 21,413.73 acfm, 301.73 °F), the writer calculated a maximum in-stack SO_2 concentration of 227.48 ppm_v, or approximately 11% of the §45-10-4.1 limit.

45CSR13: Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation

The proposed construction of the RAN Facility has the potential to emit a regulated pollutant in excess of six (6) lbs/hour and ten (10) TPY (see Attachment A) and, therefore, pursuant to §45-13-2.24, the proposed facility is defined as a "stationary source" under 45CSR13. Pursuant to §45-13-5.1, "[n]o person shall cause, suffer, allow or permit the construction . . . and operation of any stationary source to be commenced without . . . obtaining a permit to construct." Therefore, ROXUL is required to obtain a permit under 45CSR13 for the construction and operation of the proposed facility. It is noted that the proposed facility is also defined as a "major stationary source" under 45CSR14. Consistent with DAQ Policy, permitting actions reviewed under 45CR14 are concurrently reviewed under 45CSR13 and, where there is a additional or overlapping requirements, the DAQ will generally apply the stricter requirement.

As required under §45-13-8.3 ("Notice Level A"), ROXUL placed a Class I legal advertisement in a "newspaper of *general circulation* in the area where the source is . . . located." The legal ad RAN on November 22, 2017 in the *Spirit of Jefferson*. Verification that the legal ad ran was provided on December 18, 2017.

45CSR14: Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration

45CSR14 sets the requirements for the new construction of a "major stationary source" (as defined under §45-14-2.43) of air pollution, on a pollutant-by-pollutant basis, in areas that are in attainment with the National Ambient Air Quality Standards (NAAQS). A proposed facility is

defined as a "major stationary source" if, pursuant to §45-14-2.43, any regulated pollutant has a potential-to-emit in excess of 250 TPY (if a proposed source is listed as one of the source categories under §45-14-2.43, then the major stationary threshold is defined at 100 TPY). Additionally, pursuant to §45-14-8.2, Best Available Control Technology (BACT) applies to each pollutant proposed to be emitted in "significant" (as defined under §45-14-2.74) amounts.

The proposed RAN Facility will be constructed in Jefferson County, WV, which is classified as in attainment with all NAAQS. The construction of the ROXUL facility is defined as a construction of a "major stationary source" under 45CSR14 based on the PTE of VOCs exceeding 250 TPY (the facility type is a "non-listed" source) and PSD review is additionally required for the pollutants of NO_x, $PM_{2.5}$, PM_{10}, filterable particulate matter, SO_2, VOCs, GHGs, and H_2SO_4 (see Table 4). The substantive requirements of a PSD review includes a BACT analysis, an air dispersion modeling analysis, a review of potential impacts on Federal Class 1 areas, and an additional impacts analysis. Each of these will be discussed in detail under the section PSD REVIEW REQUIREMENTS below.

Table 4: Pollutants Subject to PSD

Pollutant	Potential-To-Emit (TPY)	Significance Level (TPY)	PSD (Y/N)
CO	71	100	N
NO_x	239	40	Y
$PM_{2.5}$	133	10	Y
PM_{10}	153	15	Y
Filterable PM	129	25	Y
SO_2	147	40	Y
VOCs	471	40	Y
GHGs	152,935	75,000	Y
Lead	0.0002	0.6	N
Sulfuric Acid Mist	16.37	7	Y
Flourides	0.00	3	N
Vinyl Chroloride	0.00	1	N
Total Reduced Sulfur	0.00	10	N
Reduced Sulfur Compounds	0.00	10	N

45CSR30: Requirements for Operating Permits

45CSR30 provides for the establishment of a comprehensive air quality permitting system consistent with the requirements of Title V of the Clean Air Act. The proposed RAN Facility will meet the definition of a "major source under §112 of the Clean Air Act" as outlined under §45-30-

2.26 and clarified (fugitive policy) under 45CSR30b. The proposed facility-wide PTE (see Attachment A) of a regulated pollutant does exceed 100 TPY. Therefore, as a result of this permit, the source is a major source subject to 45CSR30. The Title V (45CSR30) application will be due within twelve (12) months after the commencement date of any operation authorized by this permit.

Federal Air Quality Rules

40 CFR 60, Subpart Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units - (Non-Applicable)

40 CFR 60, Subpart Dc is the federal New Source Performance Standard (NSPS) for industrial/commercial/institutional steam generating units for which (1) construction, modification, or reconstruction is commenced after June 19, 1984, (2) that have a MDHI between 10 and 100 mmBtu/hr, and (3) meet the definition of a "steam generating unit." Pursuant, to §60.41(c), "Steam generating unit" under Subpart Dc means "a device that combusts any fuel and produces steam or heats water or heats any heat transfer medium. . . This term does not include process heaters as defined in this subpart." A "process heater" is defined as "a device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst."

The proposed PreHeat Burner (IMF24), Natural Gas Boilers 1 and 2 (CM03 and CM04), and the Rockfon Building Heater (RFN10) are each defined as a "steam generating unit" but each also has an MDHI of less than 10 mmBtu/hr which would exempt the units from Subpart Dc. The remaining combustion units either do not use a heat transfer medium or are properly defined as a process heater and, therefore, no units at the proposed facility will be subject to Subpart Dc.

40 CFR 60, Subpart Kb: Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984) - (Non-Applicable)

40 CFR 60, Subpart Kb is the federal NSPS for storage tanks which contain Volatile Organic Liquids (VOLs) and commenced construction after July 23, 1984. The Subpart applies to storage vessels used to store volatile organic liquids with a capacity greater than or equal to 75 m^3 (19,813 gallons). However, storage tanks with a capacity greater than or equal to 151 m^3 (39,890 gallons) storing a liquid with a maximum true vapor pressure less than 3.5 kilopascals (kPa) or with a capacity greater than or equal to 75 m^3 but less than 151 m^3 storing a liquid with a maximum true vapor pressure less than 15.0 kPa are exempt from Subpart Kb. All tanks that store VOLs at the proposed facility will have capacities less than 75 m^3 (19,813 gallons) and are, therefore, not subject to Subpart Kb.

40 CFR 60, Subpart Y: Standards Of Performance For Coal Preparation And Processing Plants - (Non-Applicable)

40 CFR 60, Subpart Y is the federal NSPS for coal preparation and processing plants that, pursuant to §60.250(a), process more than 200 tons of coal per day. Pursuant to §60.251, "Coal

preparation and processing plant" means "any machinery used to reduce the size of coal or to separate coal from refuse, and the equipment used to convey coal to or remove coal and refuse from the machinery. This includes, but is not limited to, breakers, crushers, screens, and conveyor belts." While the proposed RAN facility, by virtue of the coal handling and sizing equipment, would include a "coal preparation and processing plant," the maximum capacity of the proposed coal milling operation will be below the applicability threshold of 200 tons/day and, therefore, is not subject to NSPS Subpart Y.

40 CFR 60, Subpart OOO: Standards of Performance for Nonmetallic Mineral Processing Plants

Subpart OOO is the federal NSPS relating to the performance of non-metallic mineral processing plants. The proposed RAN Facility contains equipment that is applicable to Subpart OOO. The following discusses the substantive applicable requirements of Subpart OOO relating to the RAN Facility.

Subpart OOO Applicability - Section §60.670

Pursuant to §60.670, affected facilities under Subpart OOO include "each crusher, grinding mill, screening operation, bucket elevator, belt conveyor, bagging operation, storage bin, enclosed truck or railcar loading station" located at a "fixed or portable nonmetallic mineral processing plant[s]." Pursuant to §60.671, "Non-metallic processing plant" is defined as "any combination of equipment that is used to crush or grind any nonmetallic mineral. . ." The definition of "non-metallic mineral" includes limestone, dolomite, and other minerals which may be contained in stone raw materials that will be sieved, crushed (if necessary), and conveyed at the proposed RAN Facility. Therefore, Subpart OOO will be applicable to various equipment/operations at the facility (see Table 4-1 (pp. 33) in the permit application for a list of affected sources and applicable Subpart OOO standards.

However, the recycling operations (do not involve non-metallic minerals handling) and the melting furnace portable crusher (less than 150 tons per hour capacity) are not subject to Subpart OOO. Additionally, raw material handling in the furnace building is not considered non-metallic mineral processing plant as it is part of the mineral wool production operations. Table 4-1 in the permit application (pp. 33) provides a summary of Subpart OOO in tabular form.

Subpart OOO Standard for Particulate Matter - Section §60.672

Section §60.672 sets the following particulate matter standards for affected facilities under Subpart OOO:

Table 5: Subpart OOO Emission Standards

Reference	Affected Facility	Stack Emissions	
		Mass (gr/dscf)[(1)]	Opacity (%)
Table 2	Affected Facilities with Capture Systems	0.014	n/a
Table 3	Affected Facilities (non-crushers) without Capture Systems	n/a	7

Reference	Affected Facility	Stack Emissions	
		Mass (gr/dscf)[1]	Opacity (%)
Table 3	Crushers without Capture System	n/a	12
§60.672(d)	Truck Dumping	n/a	n/a
§60.672(e)	Affected Facilities inside a Building	Must meet Table 2 or Table 3 limits or building openings/vents must meet:	
	Building Openings	n/a	7
	Building Vents	Table 2 Limits	n/a
§60.672(f)	Enclosed Storage Bins w/ Baghouse	n/a	7

(1) Mass emission standard represents filterable emissions only (compliance test requires use of Method 5 or Method 17).

ROXUL has proposed fabric filters (0.002 gr/dscf) for material transfer points (IMF11-12 and IMF14-16) to minimize any potential fugitive emissions and comply with the requirements of Subpart OOO for "Affected Facilities with Capture Systems." While the charging building (B220 - IMF17 and IMF18) openings (not vents as they have no mechanical flow) are uncontrolled and subject to the 7% opacity requirement as shown above, the screen and crusher are each controlled by a fabric filter (0.002 gr/dscf) and vented inside the charging building. This should mitigate any opacity issues from the non-mechanical building openings.

Subpart OOO Test Method and Procedures - Section §60.675

Section §60.675 outlines the test methods and procedures to determine initial compliance with the standards noted above including the use of Method 9 to determine compliance with the opacity limits. ROXUL will be required to follow these requirements to determine initial compliance with the emission standards.

Subpart OOO Reporting and Record-keeping - Section §60.676

Section §60.51a outlines the reporting and record-keeping requirements required to be followed to be in compliance with Subpart OOO. ROXUL will be required to follow these requirements.

40 CFR 60, Subpart VVV: Standards Of Performance For Polymeric Coating Of Supporting Substrates Facilities - (Non-Applicable)

40 CFR 60, Subpart VVV is the NSPS for the web coating process that applies elastomers, polymers, or prepolymers to a supporting web other than paper, plastic film, metallic foil, or metal coil. Based on an analysis provided by ROXUL, Subpart VVV is not applicable to any of the coating operations at the proposed facility primarily due to the low-VOC content of the binders that would otherwise trigger Subpart VVV applicability. See Section 4.1.7 of the permit application (pp. 30) for a detailed review of the potential applicability of Subpart VVV.

40 CFR 60, Subpart IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

Subpart IIII of 40 CFR 60 is the NSPS for stationary compression ignition internal combustion engines (diesel fired engines). Section §60.4200 states that "provisions of [Subpart IIII] are applicable to manufacturers, owners, and operators of stationary compression ignition (CI) internal combustion engines (ICE)." Specifically, §60.4200(a)(2) states that Subpart IIII applies to "[o]wners and operators of stationary CI ICE that commence construction after July 11, 2005, where the stationary CI ICE are:

(i) Manufactured after April 1, 2006, and are not fire pump engines, or

(ii) Manufactured as a certified National Fire Protection Association (NFPA) fire pump engine after July 1, 2006.

ROXUL has proposed the use of a 197 hp certified fire pump engine (with a displacement of less than 30 liters per cylinder). Pursuant to §60.4205(c), "owners and operators of fire pump engines with a displacement of less than 30 liters per cylinder must comply with the emission standards in table 4 to this subpart, for all pollutants." Table 4 of Subpart IIII gives the following limits for ROXUL's proposed fire pump engine:

Table 6: Subpart IIII Table 4 Standards (175 ≤ HP<300)

Emission Standards - g/kW-hr (g/hp-hr)		
NMHC + NO_x	**CO**	**PM**
4.0 (3.0)	3.5 (2.6)	0.20 (0.15)

Pursuant to §60.4211(c), ROXUL will purchase an engine certified to comply with the standards given above. Additionally, ROXUL will:

- Operate and maintain the engine according to the manufacturer's emission related written instructions, change only those emission-related settings as permitted by the manufacturer, and comply with 40 CFR parts 89, 94 and/or 1068, as they apply [§60.4211(a)];

- Install a non-resettable hour meter and limit operation to 100 hours per year of recommended maintenance checks and readiness testing, 50 of those hours may be used for non-emergency operation [§60.4209(a), §60.4211(f)];

- Purchase diesel fuel meeting a sulfur content of 15 ppm and a minimum cetane index of 40 or a maximum aromatic content of 35 volume percent pursuant to 40 CFR §80.510(b) for non-road diesel fuel [§60.4207(b)]; and

- Record-keeping of conducted maintenance and operating hours, including reason for operation, and any other applicable notification8, reporting, and record-keeping requirements of §60.4214.

40 CFR 63, Subpart DDD: National Emission Standards for Hazardous Air Pollutants for Mineral Wool Production

Subpart DDD of 45 CFR 63 applies to owners or operators of mineral wool production facilities that are located at major sources of HAP emissions. Beginning in November 2011, the EPA proposed a series of revisions to the Mineral Wool MACT as required by the residual risk and technology review per the CAA. The final revisions were promulgated in the Federal Register and made effective on July 29, 2015.

The proposed ROXUL facility will be subject to the requirements for new affected facilities under the Mineral Wool MACT (the proposed RAN Facility is defined as a major source of HAPS - See Attachment A to this preliminary determination). Although ROXUL's proposed Melting Furnace design can be differentiated from that of a traditional cupola, it does, at its basic premise, meet the current NESHAP Subpart DDD definition of a cupola ("a large, water-cooled metal vessel to which a mixture of fuel, rock and/or slag, and additives is charged and heated to a molten state for later processing"). The revised standard includes emissions limits for carbonyl sulfide (COS) for open-top and closed-top cupolas (which replaces the CO limit under the previous rule), hydrogen fluoride (HF) and hydrochloric acid (HCl) limits for cupolas with and without slag, and combined collection (spinning) and curing oven emission limits for formaldehyde, methanol, and phenol.

Pursuant to §63.1178(a), the emission limits are given under Table 2 of Subpart DDD. The final revised emission limitations for new affected sources and the subcategories applicable to ROXUL are given below.

Table 7: Subpart DDD Table 2 Emission Limits

Affected Facility	Emission Unit (Emission Point)	Limitation	Citation
Cupolas(1)	Melting Furnace (IMF01)	0.10 lb PM/ton melt	Table 2, Item 2
Open-top Cupola(2)		3.2 lb COS/ton of melt	Table 2, Item 8
Cupola using Slag(3)		0.015 lb HF/ton of melt 0.012 lb HCl/ton of melt	Table 2, Item 10
Combined Vertical(4) Collection/Curing	Gutter Exhaust, Spinning Chamber, Curing Oven, Cooling Section (HE01)	2.4 lb formaldehyde/ton of melt 0.71 lb phenol/ton of melt 0.92 lb methanol/ton of melt	Table 2, Item 24

(1) The NESHAP Subpart DDD limit for PM is for filterable PM only.
(2) The Melting Furnace design is open-top, because there is an opening at the top of the melter and air flow is unrestricted.
(3) The Melting Furnace uses slag as a feed material.
(4) NESHAP Subpart DDD does not define the various collection designs. As described by the preamble to the proposed rule, Roxul operates a vertical collection process [76 FR 72770, November 25, 2011].

The requirements of Subpart DDD include emission and operating limitations (as summarized above) and monitoring requirements for cupolas [§63.1178, §63.1181, §63.1182] and combined collection/curing operations [§63.1179, §63.1183], performance testing [§63.1188], notifications [§63.1191], recordkeeping [§63.1192], reporting [§63.1193], and General Provisions (NESHAP Subpart A).

The revised Mineral Wool MACT also defines operating requirements during startup and shutdowns [§63.1197]. These requirements prohibit the shutdown of equipment that are utilized for compliance during times when emissions are being, or are otherwise required to be, routed to such items of equipment. In addition for cupolas, per §63.1197(e), you must maintain records during startup and shutdown that either (1) emissions were controlled using air pollution control devices operated at the parameters established by the most recent performance test that showed compliance with the standard; or (2) only clean fuels were used and the cupola was operated with 3% oxygen over the fuel demand for oxygen.

In addition, pursuant to §63.1187, ROXUL will be required to prepare an Operation, Maintenance, and Monitoring (OMM) Plan, which specifies how ROXUL will operate and maintain equipment used to demonstrate compliance with the Mineral Wool MACT.

Performance testing must be completed as specified in §63.1188 to demonstrate compliance with the emission limits in the revised Mineral Wool MACT. In addition to the performance testing reports, ROXUL must submit notification of startup of the Mineral Wool Line and a Notification of Compliance Status (NOCS) report per §63.9(h) and §63.1193 for the Mineral Wool Line Melting Furnace and Combined Collection/Curing Operations (Spinning Chamber and Curing Oven, both part of HE01), which certifies compliance with the rule.

40 CFR 63, Subpart JJJJ: National Emission Standards for Hazardous Air Pollutants: Paper and Other Web Coating

40 CFR 63, Subpart JJJJ is a federal MACT that establishes emission standards for web coating lines and specifies compliance procedures for a facility with web coating lines that is a major source of HAPs. The proposed ROXUL facility will be a major source of HAPs (see Attachment A). Based on a detailed applicability determination made by ROXUL (See Section 4.2.4. of the permit application - pp 38), only the application of fleece binder material (defined as the regulated coating in question) on the mineral wool line is subject to Subpart JJJJ.

ROXUL will be subject to the requirements for new affected facilities under the standard, which include organic HAP (OHAP) emission limitations for web coating lines. For new affected sources, pursuant to §63.3320(b), Subpart JJJJ provides four (4) options to limit OHAP emissions to:

- No more than 2 percent of the OHAP applied for each month;

- No more than 1.6 percent of the mass of coating materials applied for each month;
- No more than 8 percent of the coating solids applied for each month; or
- Outlet organic HAP concentration of 20 $ppm_v d$ by compound and 100% capture efficiency if an oxidizer is used to control organic emissions.

ROXUL has chosen to comply with the emission standards by using "as-applied" compliant coatings pursuant to the procedures given under §63.3370(a)(2). This will limit the as-applied binder to a VOC content (VOCs are allowed for use as a surrogate for OHAP per §63.3370(c)(1) and (2)) of 0.016 lb-VOC/lb-binder. ROXUL's proposed binder will meet this requirement.

Additionally, once constructed, ROXUL will be required to submit a notification for the startup of the Fleece Application line. Roxul will also be required to submit a Notification of Compliance Status (NOCS) report for the Fleece Application (CM12, CM13) line in accordance with §63.3400.

40 CFR 63, Subpart OOOO: National Emission Standard for Hazardous Air Pollutants: Printing, Coating, and Dyeing of Fabrics and Other Textiles - (Non-Applicable)

40 CFR 63, Subpart OOOO is a federal MACT that establishes standards for hazardous air pollutants for fabric and other textiles printing, coating and dyeing operations. The only potential applicability to Subpart OOOO is to the application of fleece binder material on the mineral wool line. However, pursuant to §63.4281(d)(1), Subpart OOOO does not apply to "[a]ny web coating operation that is part of the affected source of subpart JJJJ." Therefore, the Subpart OOOO does not apply as this operation is an affected facility under 40 CFR 63, Subpart JJJJ.

40 CFR 63, Subpart ZZZZ: National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

40 CFR 63, Subpart ZZZZ is a federal MACT that establishes national emission limitations and operating limitations for HAPs emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. As the RAN Facility is defined as a major source of HAPs (see Attachment A), the facility is subject to applicable requirements of Subpart ZZZZ. Pursuant to §63.6590(c):

> An affected source that meets any of the criteria in paragraphs (c)(1) through (7) of this section must meet the requirements of this part by meeting the requirements of 40 CFR part 60 subpart IIII, for compression ignition engines or 40 CFR part 60 subpart JJJJ, for spark ignition engines. No further requirements apply for such engines under this part.

§63.6590(c)(7) specifies that "[a] new or reconstructed compression ignition (CI) stationary RICE with a site rating of less than or equal to 500 brake HP located at a major source of HAP emissions" is defined as a RICE that shows compliance with the requirements of Subpart ZZZZ by "meeting the requirements of . . . 40 CFR part 60 subpart JJJJ, for spark ignition engines." Pursuant to §63.6590(a)(2)(ii), a "stationary RICE with a site rating of equal to or less than 500 brake HP located at a major source of HAP emissions is new if you commenced construction of the stationary

RICE on or after June 12, 2006." The fire pump engine proposed for the RAN Facility will be defined as a new stationary RICE and, therefore, will show compliance with Subpart ZZZZ by meeting the requirements of 40 CFR 60, Subpart IIII. Compliance with Subpart IIII is discussed above.

40 CFR 63, Subpart DDDDD: National Emission Standards for Hazardous Air Pollutants for Hazardous Air Pollutants Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters

40 CFR 63, Subpart DDDDD is a federal MACT rule that establishes national emission limitations and work practice standards for HAPs emitted from industrial, commercial, and institutional boilers and process heaters located at major sources of HAPs. The proposed ROXUL facility will be a major source of HAPs (see Attachment A).

Pursuant to §63.7485, Subpart DDDD applies to "an industrial, commercial, or institutional boiler or process heater as defined in §63.7575 that is located at, or is part of, a major source of HAPs." As noted, the RAN Facility is defined as a major source of HAPs. Based on the definition of "boiler" and "process heater," the proposed PreHeat Burner (IMF24), Natural Gas Boilers 1 and 2 (CM03 and CM04), and the Rockfon Building Heater (RFN10) are subject to Subpart DDDDD as new affected sources and are required to be in compliance with Boiler MACT upon startup. None of the units are, however, pursuant to §63.7500(e), subject to any emission standards: "Boilers and process heaters in the units designed to burn gas 1 fuels subcategory [includes natural gas] are not subject to the emission limits in Tables 1 and 2 or 11 through 13 to this subpart, or the operating limits in Table 4 to this subpart." However, the units are subject to the applicable testing, analysis, initial compliance, notification, reporting, and record-keeping requirements §63.7500-§63.7560.

PSD REVIEW REQUIREMENTS

In 1977, Congress passed the Clean Air Act Amendments (CAAA), which included the Prevention of Significant Deterioration (PSD) program. This program was designed to allow industrial development in areas that were in attainment with the NAAQS without resulting in a non-attainment designation for the area. The program, as implied in the name, permits the deterioration of the ambient air in an area (usually a county) as long as it is within defined limits (defined as "increments"). The program, however, does not allow for a significant (as defined by the rule) deterioration of the ambient air. The program prevents significant deterioration by allowing concentration levels to increase in an area within defined limits - called pollutant increments - as long as the pollutants never increase enough to exceed the NAAQS. Projected concentration levels are calculated using complex computer simulations that use meteorological data to predict impacts from the source's potential emission rates (see below). The concentration levels are then, in turn, compared to the NAAQS and increments to verify that the ambient air around the source does not significantly deteriorate (violate the increments) or violate the NAAQS. The PSD program also requires application of best available control technology (BACT) to new or modified sources, protection of Class 1 areas, and analysis of impacts on soils, vegetation, and visibility.

WV implements the PSD program as a SIP-approved state through 45CSR14. As a SIP-approved state, WV is the sole issuing authority for PSD permits. EPA has reviewed WV Legislative Rule 45CSR14 and concluded that it incorporates all the necessary requirements to successfully meet the goals of the PSD program as discussed above. EPA retains, however, an oversight role in WV's administration of the PSD program.

As stated above, the construction of the RAN Facility is defined as construction of a "major stationary source" under 45CSR14 and PSD review is required for the pollutants of NO_x, $PM_{2.5}$, PM_{10}, PM, SO_2, VOCs, H_2SO_4, and GHGs. The substantive requirements of a PSD review include a BACT analysis, an air dispersion modeling analysis, and an additional impacts analysis - each of which will be discussed below.

BACT Analysis - 45CSR14 Section 8.2

Pursuant to 45CSR14, Section 8.2, ROXUL is required to apply BACT to each emission source that emits a PSD pollutant (NO_x, $PM_{2.5}$, PM_{10}, (filterable) PM, SO_2, VOCs, H_2SO_4, and GHGs) with a PTE in excess of the amount that is defined as "significant" for that pollutant. BACT is defined under §45-14-2.12 as:

> ". . .an emissions limitation (including a visible emissions standard) based on the maximum degree of reduction for each regulated NSR pollutant which would be emitted from any proposed major stationary source or major modification which the Secretary, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any federally enforceable emissions limitations or emissions limitations enforceable by the Secretary. If the Secretary determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment work practice, operational standard or combination thereof may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation and shall provide for compliance by means which achieve equivalent results."

Pursuant to USEPA and DAQ policy, the permit applicant determines an appropriate BACT emission limit by using a "top-down" analysis. The key steps in performing a "top-down" BACT analysis are the following: 1) Identification of all applicable control technologies; 2) Elimination of technically infeasible options; 3) ranking remaining control technologies by control effectiveness; 4) Evaluation of most effective controls and documentation of results; and 5) the selection of BACT. Also included in the BACT selection process is, where appropriate, the review of BACT determinations at similar facilities using the RACT/BACT/LAER Clearinghouse (RBLC). The RBLC is a database of RACT, BACT, and LAER determinations maintained by EPA and periodically updated by the individual permitting authorities. ROXUL included a BACT analysis in their permit application under Appendix D (pp. 477) generally using the top-down approach as described above. For a detailed review of ROXUL's BACT, see Appendix D of Permit Application R14-0037. The BACT determination is summarized below.

ROXUL's BACT Submission

ROXUL broke up their BACT determination into the following broad emission units/lines:

- Material Delivery, Handling, Storage, and Transfer Operations;
- Melting Furnace;
- Gutter Exhaust, Spinning Chamber, Curing Oven Hoods, Curing Oven, and Cooling Section;
- Fleece Application;
- Rockfon Line Operations;
- Coal Milling;
- Other Facility-Wide Activities; and
- Greenhouse Gas Analysis.

For each unit/line, ROXUL generally performed, on a pollutant-by-pollutant basis, a top-down analysis for either the emissions unit or further broke the line into more specific emission units/lines. Data from the RBLC was reviewed where appropriate. The following summarizes the ROXUL's BACT selections (technology selection only, for tables/requirements containing BACT emission limits, see applicable permit section as cited in the below table):

Table 8: ROXUL BACT Summary

Emission Unit/Line	Pollutant	Technology	Draft Permit Citation
Material Delivery, Handling, Storage, and Transfer Operations			
Fugitive Emissions	$PM_{2.5}$, PM_{10}, (filterable) PM	Enclosures, Good Housekeeping Practices, Subpart OOO Compliance(1)	Table 4.1.2(d)
Vent/Stack Emissions	$PM_{2.5}$, PM_{10}, (filterable) PM	Baghouses/Fabric Filters, Subpart OOO Compliance(1)	Table 4.1.2(c)
Portable Crusher	$PM_{2.5}$, PM_{10}, (filterable) PM	Hours of Operation Limit	Table 4.1.2(a) Table 4.1.2(e)
Melting Furnace			
Melting Furnace	NO_x	Integrated SNCR, Oxy-Fired Burners	Table 4.1.4(a)
	$PM_{2.5}$, PM_{10}, (filterable) PM	Baghouse	
	SO_2, H_2SO_4	Sorbent Injection	
	VOCs	Good Combustion Practices(2)	
	GHGs	Energy Efficiency(3)	

Emission Unit/Line	Pollutant	Technology	Draft Permit Citation
Gutter Exhaust, Spinning Chamber, Curing Oven Hoods, Curing Oven, and Cooling Section			
Gutter Exhaust, Spinning Chamber, Curing Oven Hoods, Curing Oven, Cooling Section	NO_x	LNB, Good Combustion Practices	Table 4.1.5(a)
	$PM_{2.5}$, PM_{10}, (filterable) PM	Wet Electrostatic Precipitator (WESP)	
	SO_2	Use of Natural Gas	
	VOCs	Afterburner/ Good Combustion Practices[4]	
	GHGs	Use of Natural Gas, Good Combustion Practices	
Fleece Application			
Fleece Application	VOCs	Low-VOC Coatings, Good Work Practices	4.1.6(a) and (b)
Rockfon Line Operations			
Use of Glue/Coatings	VOCs	Low-VOC Coatings, Good Work Practices	4.1.7(a) and (b)
IR Zone, Hot Press, and Curing	$PM_{2.5}$, PM_{10}, (filterable) PM	Low-Emitting Process[5]	Table 4.1.7(d)
De-Dusting Baghouse	$PM_{2.5}$, PM_{10}, (filterable) PM	Fabric Filter	
Drying Oven 1, Drying Ovens 2 & 3, High Oven A, High Oven B	NO_x	Good Combustion Practices	
	$PM_{2.5}$, PM_{10}, (filterable) PM	Particulate Filters[6], Use of Natural Gas, Good Combustion Practices	
	SO_2	Use of Natural Gas	
	VOCs	Good Combustion Practices	
	GHGs	Use of Natural Gas, Good Combustion Practices	
Cooling Zone	$PM_{2.5}$, PM_{10}, (filterable) PM	Low-Emitting Process[5]	
Spray Paint Cabin	VOCs	Particulate Filter	

Emission Unit/Line	Pollutant	Technology	Draft Permit Citation
Coal Milling			
Coal Milling & Drying	NO_x	LNB, Dryer Temperature Control	Table 4.1.3(d)
	$PM_{2.5}$, PM_{10}, (filterable) PM	Baghouse	
	SO_2	Use of Natural Gas	
	VOCs	Good Combustion Practices	
	GHGs	Use of Natural Gas, Good Combustion Practices	
Other Facility-Wide Activities			
Other Small Natural Gas Fired Combustion Devices	NO_x	Good Combustion Practices	Table 4.1.8(b), Table 4.1.11(c)(1)
	$PM_{2.5}$, PM_{10}, (filterable) PM	Use of Natural Gas, Good Combustion Practices	
	SO_2	Use of Natural Gas	
	VOCs	Good Combustion Practices	
	GHGs	Use of Natural Gas, Good Combustion Practices	
Emergency Fire Pump Engine	NO_x	Subpart IIII Certification, Annual Hrs (100) of Op Limit	Table 4.1.10(b)
	$PM_{2.5}$, PM_{10}, (filterable) PM		
	SO_2	ULSD Fuel, Annual Hrs (100) of Op Limit	
	VOCs	Subpart IIII Certification, Annual Hrs (100) of Op Limit	
	GHGs	Annual Hrs (100) of Op Limit	
Product Marking Ink Usage	VOCs	Good Work Practices	4.1.11(c)(3)
Cooling Towers	$PM_{2.5}$, PM_{10}, (filterable) PM	High Efficiency Drift Eliminator	Table 4.1.11(b)(2)
Dry Ice Production	GHGs	Production Efficiency	Table 4.1.11(a)

(1) ROXUL concluded that add-on controls were not warranted or appropriate for certain emission units/processes and BACT for these units will be compliance with PPH limits and Subpart OOO limits where applicable.

(2) Specific to the Melting Furnace, Good Combustion Practices includes maintaining a proper oxidizing atmosphere to control VOC emissions through the use of Good Combustion Practices. For all other applications Good Combustion Practices shall mean activities such as maintaining operating logs and record-keeping, conducting training, ensuring maintenance knowledge, performing routine and preventive maintenance, conducting burner and control adjustments, monitoring fuel quality, etc.

(3) Energy Efficiency measures listed in Table D-9-2 (pp. 554-555) of the permit application.

(4) The Afterburner only represents the BACT Technology for the Curing Ovens, all other sources listed under this section will utilize Good Combustion Practices as BACT.

(5) The emission unit/line is of such a nature that it emits only a small amount of pollutants and, therefore, add-on controls or work practice requirements are not warranted.

(6) Filters on Drying Oven 1 and Drying Oven 2 & 3 only.

DAQ Conclusion on BACT Analysis

The DAQ has concluded that ROXUL reasonably conducted a BACT analysis using, where appropriate, the top-down analysis and eliminated technologies for valid reasons. The DAQ further concludes that the selected BACT emission rates given in the draft permit are achievable, are consistent where appropriate with recent applicable BACT determinations, and are accepted as BACT. Further, the DAQ accepts the selected technologies as BACT.

Modeling Analysis - 45CSR14 Section 9 and Section 10

§45-14-9 and §45-14-10 contain requirements relating to a proposed major source's impact on air quality (Section 9) and the requirements for the air dispersion modeling used to determine the potential impact (Section 10). Specifically, §45-14-9.1 requires subject sources to demonstrate that "allowable emission increases from the proposed source or modification, in conjunction with all other applicable emission increases or reductions (including secondary emissions), would not cause or contribute to" (1) a NAAQS violation or (2) an exceedance of a maximum allowable increase over the baseline concentration in any area (exceed the increment).

Pursuant to the above, ROXUL was required to do an air dispersion modeling analysis to determine the potential impacts on Class II areas only. Class I area modeling was not performed (as explained below). The pollutants required to be modeled were NO_x, $PM_{2.5}$, PM_{10}, and SO_2. Greenhouse gases are not modeled as part of the PSD application review process and VOC emissions (as a precursor to tropospheric ozone formation) were addressed through a qualitative analysis by the applicant in the modeling protocol. The results of the modeling analyses are summarized below. More detailed descriptions of these modeling analyses and quantitative results are contained in reports attached to this evaluation as Attachment B. The reports were prepared by Mr. Jon McClung of DAQ's Planning Section.

Class I Modeling

As part of the Clean Air Act Amendments (CAA) of 1977, Congress designated a list of national parks, memorial parks, wilderness areas, and recreational areas as federal Class I air quality areas. Federal Class I areas are defined as national parks over 6,000 acres, and wilderness areas and memorial parks over 5,000 acres. As part of this designation, the CAA gives the Federal Land Managers (FLM's) an affirmative responsibility to protect the natural and cultural resources of Class I areas from the adverse impacts of air pollution. The impacts on a Class I area from an emissions source are determined through complex computer models that take into account the source's emissions, stack parameters, meteorological conditions, and terrain.

If an FLM demonstrates that emissions from a proposed source will cause or contribute to adverse impacts on the air quality related values (AQRV's) of a Class I area, and the permitting authority concurs, the permit will not be issued. The AQRVs typically reviewed, in the case of evaluating adverse impacts, are visibility (both regional and direct plume impact) and acid deposition (including both nitrogen and sulfur).

Additionally, the Class I Increments may not be exceeded. Class I Increments are limits to how much the air quality may deteriorate from a reference point (called the baseline). There are Class I Increments for NO_2, $PM_{2.5}$, PM_{10}, and SO_2.

There are generally four Class I areas that may have to be considered when conducting PSD reviews in West Virginia. These are, in West Virginia, the Otter Creek Wilderness Area and the Dolly Sods Wilderness Area; both of which are managed by the US Forest Service. The Shenandoah National Park, managed by the National Park Service (NPS), and the James River Face Wilderness Area, managed by the US Forest Service (USFS), are in Virginia. The RAN Facility is approximately 153 kilometers (km) from the Otter Creek Wilderness Area, 131 km from the Dolly Sods Wilderness Area, 60 km from the Shenandoah National park, and 220 km from the James River Face Wilderness Area.

The Federal Land Managers responsible for evaluating affects on AQRVs for federally protected Class I areas were, through standard procedure, provided with information concerning the proposed facility upon the submission of the permit application. On January 18, 2018, the NPS and the USFS notified the DAQ that an AQRV analysis was not required for the proposed RAN Facility.

However, ROXUL evaluated the project related increase of NO_2, PM_{10}, $PM_{2.5}$, and SO_2 against the Class I SILs by applying the AERMOD dispersion model at a distance of 50 km from the Project site. This proposed analysis represents the maximum spatial extent (50 km from source to receptor) for regulatory applications of AERMOD. The receptors were placed at 1° intervals on an arc that represents the angular distance of the Class I area at 50 km from the project site. The angular distance was determined based on the receptors used by the NPS to represent each Class I area for refined air quality modeling analyses. The maximum modeled concentrations at the 50 km receptors were less than the Class I SILs for NO_2, and is therefore assumed that the project also had maximum potential NO_2 impacts that were less than the SILs at the more distant Class I areas.

For pollutants that the AERMOD screening evaluation showed exceeding the Class I SILs (PM_{10}, $PM_{2.5}$, and SO_2), ROXUL used a refined analysis with the CALPUFF model to evaluate the project impact within the park proper. This analysis, the results of which are given in Table 4-4 of ROXUL's Air Quality Modeling Report (pp. 38), show that CALPUFF modeled concentrations are less than Class I SILs.

Class II Modeling

A Class II Modeling analysis can require up to three runs to determine compliance with Rule 14. First, the proposed source is modeled by itself, on a pollutant by pollutant basis, to determine if it produces a "significant impact;" an ambient concentration published by US EPA. If the dispersion model determines that the proposed source produces significant impacts, then the demonstration proceeds to the second stage. If the model finds that the proposed source produces "insignificant impacts", no further modeling is needed. The modeling, the results of which are given

in Table 4 of Attachment B, indicated that NO_2, $PM_{2.5}$ and PM_{10} were "significant," thereby requiring the applicant to proceed to the next stage of the modeling process for that pollutant.

The next tier of the modeling analysis is to determine if the proposed facility in combination with the existing sources will produce an ambient impact that is less than the National Ambient Air Quality Standards (NAAQS). As shown in Table 5 of Attachment B, the total concentration of each pollutant is less than the NAAQS for all averaging periods.

This final stage is usually to determine how much of the PSD Increment the proposed construction of the facility consumes, along with all other increment consuming sources. This value may not exceed the PSD Increment. PSD Increments are the maximum concentration increases above a baseline concentration that are allowed in a specific area. As shown in Table 6 of Attachment B, the total concentration is less than the PSD increment for each pollutant and all averaging times.

The applicant therefore passes all the required Air Quality Impact Analysis tests as required for Class II Areas under 45CSR14. Attachment B to this evaluation is a report prepared by Jon McClung on March 2, 2018 (for the complete report with all the attachments, please see the filed document) that discussed in depth the above analysis and presents the results in tabular form.

Additional Impacts Analysis - 45CSR14 Section 12

Section 12 of 45CSR14 requires an applicant to provide "an analysis of the impairment to visibility, soils, and vegetation that would occur as a result of the source or modification and general commercial, residential, industrial, and other growth associated with the source or modification." No quantified thresholds are promulgated for comparison to the additional impacts analysis.

However, ROXUL conducted an analysis of the proposed RAN Facility's modeled impacts against NO_2 and SO_2 screening levels taken from Table 5.3 of the EPA Document "*A Screening Procedure for the Impact of Air Pollution Sources on Plants, Soils, and Animals*." The screening levels represent the minimum concentrations in either plant tissue or soils at which adverse growth effects or tissue injury was reported in the literature. In addition, ROXUL also compared modeled impacts of NO_2, PM_{10}, $PM_{2.5}$, and SO_2 against the Secondary NAAQS, which are designed to protect public welfare; including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. This quantitative analysis, given in Table 4-6 of ROXUL's Air Quality Modeling Report (pp. 40), shows that the maximum modeled impacts do not exceed any of the screening levels or Secondary NAAQS.

Additionally, using EPA's VISCREEN modeling software, ROXUL conducted a visibility analysis at the Antietam National Battlefield and the Harper's Ferry National Historical Park to determine if the impacts from the proposed RAN Facility would cause an adverse impact on visibility at either location. Based on this analysis (the full report is in the file), the impacts would be below the VISCREEN threshold of concern contrast criteria of 0.05 at each location.

Minor Source Baseline Date - Section 2.42.b

On December 21, 2017 the permit application R14-0037 was deemed complete. This action, pursuant to 45CSR14, Section 2.42(b), has triggered the minor source baseline date (MSBD) for the following areas per specific pollutant:

Table 9: Minor Source Baseline Triggering

Pollutant	Berkeley County	Jefferson County
NO_2	Previously	Yes
$PM_{2.5}$	Previously	Yes
PM_{10}	Previously	Yes
SO_2	Yes	Yes

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the proposed RAN Facility and that are not classified as "criteria pollutants." Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO_x), Ozone, Particulate Matter (PM_{10} and $PM_{2.5}$), and Sulfur Dioxide (SO_2). These pollutants have National Ambient Air Quality Standards (NAAQS) set for each that are designed to protect the public health and welfare. Other pollutants of concern, although designated as non-criteria and without national concentration standards, are regulated through various federal programs designed to limit their emissions and public exposure. These programs include federal source-specific Hazardous Air Pollutants (HAPs) limits promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Any potential applicability to these programs were discussed above under REGULATORY APPLICABILITY.

HAPS

The majority of non-criteria regulated pollutants fall under the definition of HAPs which, with some revision since, were 188 compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. The following table lists the carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)) of each HAP identified by ROXUL as being emitted in substantive amounts:

Table 10: Potential HAPs - Carcinogenic Risk

HAPs	Type	Known/Suspected Carcinogen	Classification
Acetaldehyde	VOC	Yes	B2 - Probable Human Carcinogen
Acrolein	VOC	No	Inadequate Data

HAPs	Type	Known/Suspected Carcinogen	Classification
Formaldehyde	VOC	Yes	B1 - Probable Human Carcinogen
Methanol	VOC	No	No Assessment Available
Biphenyl	VOC	Yes	Suggestive Evidence of Carcinogenic Potential
1,3-Butadiene	VOC	Yes	B2 - Probable Human Carcinogen
Naphthalene	VOC	Yes	C - Possible Human Carcinogen
n-Hexane	VOC	No	Inadequate Data
Benzene	VOC	Yes	Category A - Known Human Carcinogen
Toluene	VOC	No	Inadequate Data
Ethylbenzene	VOC	No	Category D - Not Classifiable
Xylenes	VOC	No	Inadequate Data
2,2,4-Trimethylpentane	VOC	No	Inadequate Data

All HAPs have other non-carcinogenic chronic and acute effects. These adverse health affects may be associated with a wide range of ambient concentrations and exposure times and are influenced by source-specific characteristics such as emission rates and local meteorological conditions. Health impacts are also dependent on multiple factors that affect variability in humans such as genetics, age, health status (e.g., the presence of pre-existing disease) and lifestyle. As stated previously, *there are no federal or state ambient air quality standards for these specific chemicals*. For a complete discussion of the known health effects of each compound refer to the IRIS database located at *www.epa.gov/iris*.

Sulfuric Acid Mist (H_2SO_4)

The compound of H_2SO_4 is regulated under 45CSR14 with a significance level that can trigger BACT for each source that contributes H_2SO_4 emissions. As discussed above, the potential H_2SO_4 emissions from the facility triggered a BACT analysis for the compound. H_2SO_4 is not represented in the IRIS database and is not listed as a HAP. Concerning the carcinogenity of sulfuric acid, the Agency for Toxic Substances and Disease Registry (ATSDR) states that "[t]he ability of sulfuric acid to cause cancer in laboratory animals has not been studied. The International Agency for Research on Cancer (IARC) has determined that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans. IARC has not classified pure sulfuric acid for its carcinogenic effects."

MONITORING, COMPLIANCE DEMONSTRATIONS, REPORTING, AND RECORDING OF OPERATIONS

Monitoring and Compliance Demonstrations

The primary purpose of emissions monitoring is to determine continuous compliance with emission limits and operating restrictions in the permit over a determined averaging period. Emissions monitoring may include any or all of the following:

- Real-time continuous emissions monitoring to sample and record pollutant emissions (CEMS, COMS);
- Parametric monitoring of variables pre-determined to be proportional (at a known ratio) to emissions (recording of material throughput, fuel usage, production, etc.);
- Real-time tracking of materials and pollutant percentages used in processes where evaporation emissions are expected;
- Monitoring of control device performance indicators (pressure drops, catalyst injection rates, oxidizer temperatures, etc.) to guarantee efficacy of pollution control equipment; and
- Visual stack observations to monitor opacity.

It is the permittee's responsibility to record, certify, and report the monitoring results so as to verify compliance with the emission limits. Where emissions are based on the maximum rated short and long-term capacity of units, generally no continuous emissions or parametric monitoring is required as compliance with the emission limits is based on the specific limited capacity of the units.

For the proposed RAN Facility, a mix of the above methods are used to give a reasonable assurance that continuous compliance with emission limits is being maintained. Specifically, some examples include the required use of CEMS (for CO, NO_x and SO_2) on the Melting Furnace, hours of operation monitoring on the portable crusher and the emergency fire pump, actual VOC/HAPs material balance tracking on all ink, coating, glue, and cleaner usage, and control device monitoring on the Melting Furnace Baghouse, the WESP, and the Curing Oven Afterburner. Visible emissions monitoring, in addition to that required under 40 CFR 60, Subpart OOO, will be required monthly on the larger particulate matter sources.

Refer to Section 4.2 of the draft permit for all the unit-specific monitoring, compliance demonstration, reporting, and record-keeping requirements (MRR).

Record-Keeping

ROXUL will be required to follow the standard record-keeping boilerplate language as given under Section 4.4 of the draft permit. This will require ROXUL to maintain records of all data

monitored in the permit and keep the information for a minimum of five years. All collected data will be available to the Director upon request. ROXUL will also be required to follow all the record-keeping requirements as applicable under the variously applicable state and federal rules.

Reporting

Beyond the requirement to follow all reporting requirements as applicable under the variously applicable state and federal rules, ROXUL will be required to submit the following substantive reports:

- The results of the stack test within sixty (60) days of completion of the test. The test report shall provide the information necessary to document the objectives of the test and to determine whether proper procedures were used to accomplish these objectives [*3.3.1(d)*];

- When necessary, any deviation of the allowable visible emission requirement for any emission source discovered during observation using 40CFR Part 60, Appendix A, Method 9 must be reported in writing to the Director of the DAQ as soon as practicable, but within ten (10) calendar days, of the occurrence and shall include, at a minimum, the following information: the results of the visible determination of opacity of emissions, the cause or suspected cause of the violation(s), and any corrective measures taken or planned [*4.2.13(g)*];

- A report detailing all required monitoring on or before September 15 for the reporting period January 1 to June 30 and March 15 for the reporting period July 1 to December 31. All instances of deviation from permit requirements must be clearly identified in such reports [*4.5.1(a)*]; and

- On or before March 15, a certification of compliance with all requirements of the draft permit for the previous calendar year ending on December 31 [*4.5.1(b)*].

General requirements relating to the process of reporting are given under 3.5 of the draft permit.

PERFORMANCE TESTING OF OPERATIONS

Performance testing is required to verify, where reasonable and appropriate, the emissions or emission factors used to determine emission units' potential-to-emit and to show initial or periodic compliance with permitted emission limits. Performance testing must be conducted in accordance with accepted test methods and according to a protocol approved by the Director prior to testing (as outlined under 3.3 of the draft permit). The following table details the initial (within 60 days after achieving the maximum permitted production rate of the emission unit in question, but not later than 180 days after initial startup of the unit) performance testing required of specific emission units:

Table 12: Initial Performance Testing Requirements

Emission Unit(s)	Emission Point	Pollutants	Limit
Melting Furnace	IMF01	All Pollutants under Table 4.1.4(a) with the exception of Mineral Fiber, Total HAPs, and CO_2e.	PPH(2)
Gutter Exhaust, Spinning Chamber, Curing Oven Hoods, Curing Oven, and Cooling Section	HE01	All Pollutants under Table 4.1.5(a) with the exception of SO_2, Mineral Fiber, Total HAPs, and CO_2e.	PPH(2)
Rockfon Line	RFNE8	$PM_{2.5(1)}$, $PM_{10(1)}$, PM(1)	PPH gr/dscf (PM only)
De-Dusting Baghouse (CE01-BH)	CE01	$PM_{2.5(1)}$, $PM_{10(1)}$, PM(1)	PPH gr/dscf
Recycle Building Vent 1	CM10	$PM_{2.5(1)}$, $PM_{10(1)}$, PM(1)	PPH gr/dscf

(1) Filterable Only.
(2) Required performance testing to show compliance with the MACT standards (in lb/ton-melt) may be converted and used for compliance with the PPH limits.

Periodic testing will then be required as based on the schedule given in Table 4.3.3. of the draft permit. Refer to Section 4.3 of the draft permit for all performance testing requirements.

RECOMMENDATION TO DIRECTOR

The WVDAQ has preliminarily determined that the proposed construction of ROXUL USA, Inc.'s RAN Facility in Ranson, Jefferson County will meet the emission limitations and conditions set forth in the DRAFT permit and will comply with all current applicable state and federal air quality rules and standards including 45CSR14, the WV Legislative Rule implementing the Prevention of Significant Deterioration program. A final decision regarding the DRAFT permit will be made after consideration of all public comments. It is the recommendation of the undersigned, upon review and approval of this document and the DRAFT permit, that the WVDAQ, pursuant to §45-14-17, go to public notice on permit application R14-0037.

Joseph R. Kessler, PE
Engineer

Date

Attachment A: Facility-Wide PTE

ROXUL USA, Inc.: RAN Facility

Permit Number R14-0037: Facility ID 037-00108

Emission Unit	EP ID	CO		NO_x		$PM_{2.5}$[1]		PM_{10}[1]		PM[1]		SO_x		VOCs		HAPs		CO_2e	
		lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Melting Furnace	IMF01	11.21	49.10	37.37	163.67	7.47	32.73	8.22	36.01	9.79	42.88	33.63	147.31	11.66	51.08	3.43	15.04	21,814	95,547
WESP[2]	HE01	1.82	7.97	14.55	63.73	19.22	84.20	21.21	92.89	40.43	177.10	0.01	0.05	78.02	341.71	77.07	337.57	8,138	35,644
Gutter Cooling Tower	HE02	0.00	0.00	0.00	0.00	1.16e-03	0.01	2.31e-03	0.01	2.31e-03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Furnace Cooling Tower	IMF02	0.00	0.00	0.00	0.00	4.96e-03	0.02	1.00e-02	0.04	1.00e-02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Coal Storage Silo A	IMF03A	0.00	0.00	0.00	0.00	6.00e-03	0.03	1.30e-02	0.06	1.30e-02	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Coal Storage Silo B	IMF03B	0.00	0.00	0.00	0.00	6.00e-03	0.03	1.30e-02	0.06	1.30e-02	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Coal Storage Silo C	IMF03C	0.00	0.00	0.00	0.00	6.00e-03	0.03	1.30e-02	0.06	1.30e-02	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Conveyor Transfer Point	IMF04	0.00	0.00	0.00	0.00	1.00e-02	0.04	1.90e-02	0.09	1.90e-02	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Coal Milling Burner	IMF05	0.49	2.15	0.42	1.86	0.26	1.06	0.32	1.33	0.30	1.33	3.51e-03	0.02	0.41	1.65	0.01	0.05	703	3,079
CM De-Dusting Baghouse	IMF06	0.00	0.00	0.00	0.00	0.11	0.48	0.22	0.97	0.22	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Filter Fines Day Silo	IMF07A	0.00	0.00	0.00	0.00	6.89e-03	0.03	0.01	0.06	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Secondary Energy Silo	IMF07B	0.00	0.00	0.00	0.00	6.89e-03	0.03	0.01	0.06	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Sorbent Silo	IMF08	0.00	0.00	0.00	0.00	6.61e-03	0.03	0.01	0.06	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Spent Sorbent Silo	IMF09	0.00	0.00	0.00	0.00	6.61e-03	0.03	0.01	0.06	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Filter Fines Receiving Silo	IMF10	0.00	0.00	0.00	0.00	6.61e-03	0.03	0.01	0.06	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Conveyor Transfer Point	IMF11	0.00	0.00	0.00	0.00	1.00e-02	0.04	1.90e-02	0.09	1.90e-02	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Conveyor Transfer Point	IMF12	0.00	0.00	0.00	0.00	1.00e-02	0.04	1.90e-02	0.09	1.90e-02	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Conveyor Transfer Point	IMF13	0.00	0.00	0.00	0.00	1.00e-02	0.04	1.90e-02	0.09	1.90e-02	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Conveyor Transfer Point	IMF14	0.00	0.00	0.00	0.00	1.00e-02	0.04	1.90e-02	0.09	1.90e-02	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Conveyor Transfer Point	IMF15	0.00	0.00	0.00	0.00	1.00e-02	0.04	1.90e-02	0.09	1.90e-02	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Conveyor Transfer Point	IMF16	0.00	0.00	0.00	0.00	1.00e-02	0.04	1.90e-02	0.09	1.90e-02	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Charging Building Vent 1	IMF17	0.00	0.00	0.00	0.00	0.01	0.04	0.02	0.08	0.02	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Charging Building Vent 2	IMF18	0.00	0.00	0.00	0.00	0.01	0.04	0.02	0.08	0.02	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Vacuum Cleaning Filter	IMF21	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0	0

Emission Unit	EP ID	CO		NO_x		$PM_{2.5}$[1]		PM_{10}[1]		PM[1]		SO_x		VOCs		HAPs		CO_2e	
		lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Preheat Burner	IMF24	0.42	1.84	0.36	1.58	0.04	0.17	0.04	0.17	0.04	0.17	0.00	0.01	0.03	0.12	~0.00	~0.00	600	2,627
Coal Feed Tank	IMF25	0.00	0.00	0.00	0.00	6.61e-03	0.03	0.01	0.06	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Portable Crusher[3]	B170	0.00	0.00	0.00	0.00	0.22	0.06	1.00	0.27	2.19	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0	0
RMS - Loading	B210	0.00	0.00	0.00	0.00	7.41e-02	2.00e-02	4.81e-01	1.30e-01	1.04e+00	2.80e-01	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Raw Material Loading	B215	0.00	0.00	0.00	0.00	9.08e-04	3.98e-03	6.00e-03	2.63e-02	1.27e-02	5.55e-02	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Coal Unloading	B230	0.00	0.00	0.00	0.00	2.03e-04	5.49e-05	1.34e-03	3.63e-04	2.84e-03	7.67e-04	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Coal Unloading Hopper	B231	0.00	0.00	0.00	0.00	2.03e-04	5.49e-05	1.34e-03	3.63e-04	2.84e-03	7.67e-04	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Coal Milling Building	B235	0.00	0.00	0.00	0.00	5.00e-03	2.00e-02	9.00e-03	4.00e-02	9.00e-03	4.00e-02	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Reject Bin	RM_REJ	0.00	0.00	0.00	0.00	8.57e-06	7.51e-05	5.51e-05	4.83e-04	1.16e-04	1.02e-03	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Reject Bin	S_REJ	0.00	0.00	0.00	0.00	8.34e-06	7.31e-05	5.51e-05	4.83e-04	1.16e-04	1.02e-03	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Raw Material Storage[4]	RMS	0.00	0.00	0.00	0.00	1.80e-03	7.87e-03	2.05e-02	9.00e-02	2.51e-02	1.10e-01	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Natural Gas Boiler 1	CM03	0.42	1.84	0.18	0.79	0.04	0.17	0.04	0.17	0.04	0.17	0.00	0.01	0.03	0.12	~0.00	~0.00	600	2,627
Natural Gas Boiler 2	CM04	0.42	1.84	0.18	0.79	0.04	0.17	0.04	0.17	0.04	0.17	0.00	0.01	0.03	0.12	~0.00	~0.00	600	2,627
Recycle Building Vent 1	CM08	0.00	0.00	0.00	0.00	0.03	0.12	0.06	0.24	0.06	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Recycle Building Vent 2	CM09	0.00	0.00	0.00	0.00	0.03	0.12	0.06	0.24	0.06	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Recycle Building Vent 3	CM10	0.00	0.00	0.00	0.00	0.33	1.45	0.66	2.90	0.66	2.90	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Recycle Building Vent 4	CM11	0.00	0.00	0.00	0.00	0.33	1.45	0.66	2.90	0.66	2.90	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Fleece Application Vent 1	CM12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.53	28.58	6.53	28.58	0	0
Fleece Application Vent 2	CM13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0	0
De-dusting Baghouse	CE01	0.00	0.00	0.00	0.00	0.77	3.38	0.77	3.38	1.54	6.76	0.00	0.00	0.00	0.00	0.77	3.38	0	0
Vacuum Baghouse	CE02	0.00	0.00	0.00	0.00	0.22	0.97	0.22	0.97	0.44	1.93	0.00	0.00	0.00	0.00	0.22	0.97	0	0
Dry Ice Cleaning	DI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	364	1,594
P_MARK Combustion	P_MARK	0.03	0.14	0.04	0.17	2.96e-03	0.01	2.96e-03	0.01	2.96e-03	0.01	2.34e-03	1.06e-04	2.14e-03	9.39e-03	~0.00	~0.00	47	205
P_MARK Inks/Coatings		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.16	9.49	0.00	0.00	0	0
IR Zone	RFNE1	0.00	0.00	0.00	0.00	0.01	0.06	0.02	0.08	0.02	0.08	0.00	0.00	0.02	0.06	0.02	0.10	0	0

Emission Unit	EP ID	CO		NO_x		$PM_{2.5}$[1]		PM_{10}[1]		PM[1]		SO_x		VOCs		HAPs		CO_2e	
		lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Hot Press	RFNE2	0.00	0.00	0.00	0.00	0.01	0.06	0.02	0.08	0.02	0.08	0.00	0.00	0.02	0.06	0.02	0.10	0	0
High Oven A	RFNE3	0.22	0.98	0.27	1.17	0.09	0.38	0.12	0.51	0.12	0.51	0.01	0.01	0.01	0.06	0.10	0.43	320	1,400
Drying Oven 1	RFNE4	0.17	0.73	0.20	0.87	0.06	0.27	0.08	0.36	0.08	0.36	0.01	0.01	0.01	0.05	0.08	0.34	240	1,050
Spraying Cabin	RFNE5	0.00	0.00	0.00	0.00	0.66	2.90	0.88	3.86	0.88	3.86	0.00	0.00	0.08	0.34	0.52	2.27	0	0
Drying Oven 2 & 3	RFNE6	0.39	1.71	0.47	2.04	0.09	0.41	0.13	0.55	0.13	0.55	0.01	0.01	0.03	0.49	0.15	0.66	559	2,450
Cooling Zone	RFNE7	0.00	0.00	0.00	0.00	0.14	0.63	0.19	0.84	0.19	0.84	0.00	0.00	0.12	0.48	0.21	0.91	0	0
De-Dusting Baghouse	RFNE8	0.00	0.00	0.00	0.00	0.17	0.75	0.34	1.49	0.34	1.49	0.00	0.00	0.00	0.00	0.34	1.49	0	0
Rockfon Glue & Coatings	Various	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.25	36.14	0.00	0.00	0	0
High Oven B	RFNE9	0.22	0.98	0.27	1.17	0.09	0.38	0.12	0.51	0.12	0.51	0.01	0.01	0.01	0.06	0.10	0.43	320	1,400
Building Heater	RFN10	0.42	1.84	0.18	0.79	0.04	0.17	0.04	0.17	0.04	0.17	0.00	0.01	0.03	0.12	~0.00	~0.00	600	2,627
Storage Tanks	Various	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.19	0.03	0.12	0	0
Emergency Fire Pump	EFP1	1.13	0.28	1.30	0.32	0.08	0.02	0.08	0.02	0.08	0.02	2.14e-03	5.36e-04	0.19	0.05	~0.00	~0.00	1,120	56
Paved Haul Roads	n/a	0.00	0.00	0.00	0.00		0.10		0.43		2.18	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Facility-Wide Total[6][7] ➜		***17.36***	***71.40***	***55.79***	***238.95***	***30.79***	***133.39***	***36.35***	***153.21***	***59.87***	***250.90***	***33.70***	***147.46***	***107.68***	***470.96***	***89.59***	***392.44***	***36,023***	***152,933***

(1) Includes condensables.
(2) WESP is the control device for the following sources venting to it: Gutter Exhaust, Spinning Chamber, Curing Oven Hoods, Curing Oven, Cooling Section, and the Afterburner.
(3) Includes emissions from drop from crusher to pit stockpile and erosion from stockpile.
(4) Includes both emission from delivery to stockpile as well as stockpile erosion.
(5) Does not include emissions from glue and coating application.
(6) The small differences in facility-wide totals from the tables in the Permit Application are primarily due to rounding differences.
(7) As the aggregate annual PTE of total HAPs is in excess of 25 TPY, the facility is defined as a major source of HAPs.

Attachment B: Air Dispersion Modeling Report

ROXUL USA, Inc.: RAN Facility

Permit Number R14-0037: Facility ID 037-00108

Exhibit K

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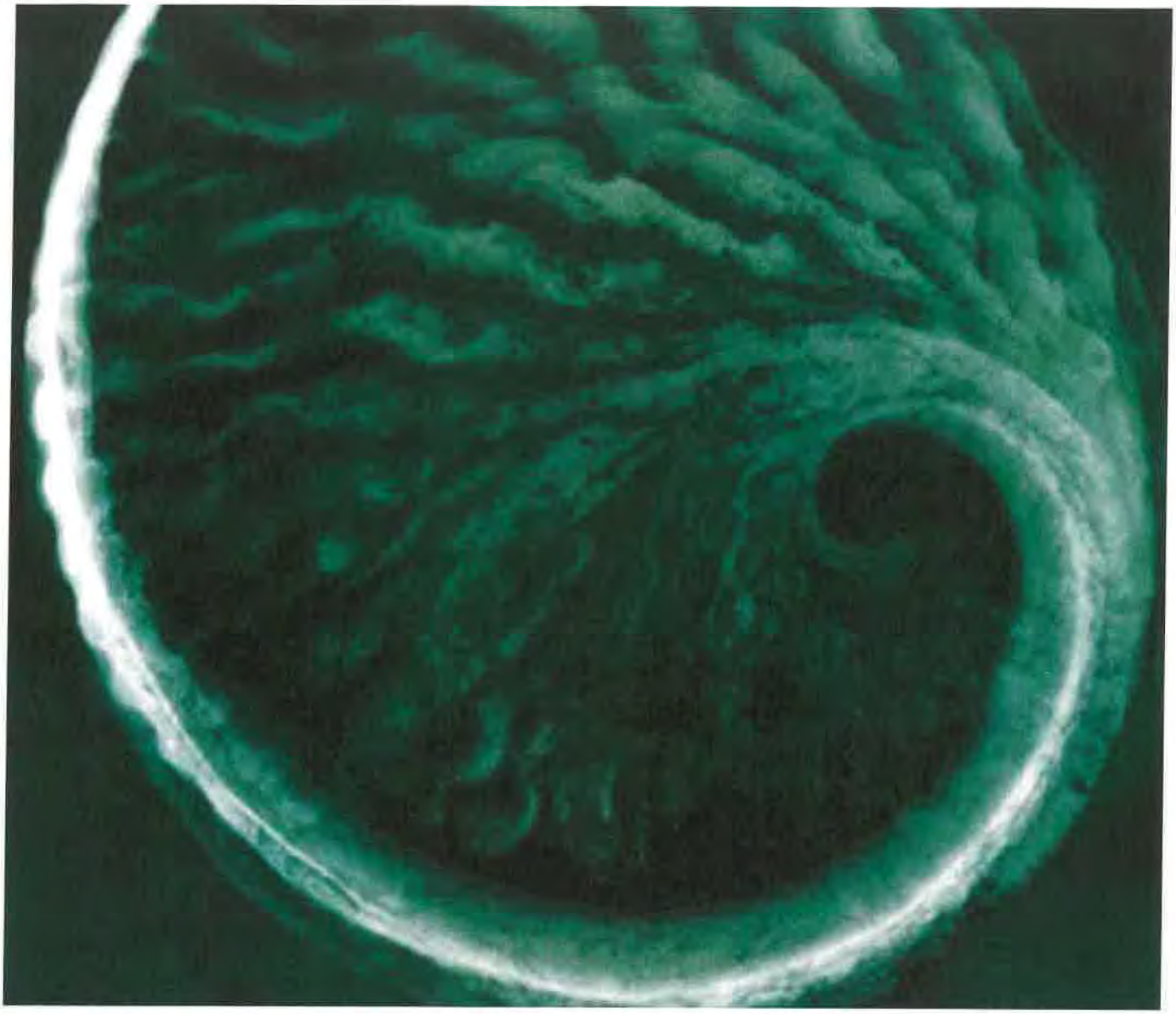

ROXUL™

ORIGINAL

Prevention of Significant Deterioration (PSD) Application for the Construction of a Mineral Wool Manufacturing Facility

Roxul USA, Inc.
Jefferson County, West Virginia

January 2018

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Approximate costs for capturing, transporting, and storing the CO_2 emissions from the Melting Furnace are shown in Appendix D-1. At approximately $176 per ton of CO_2e controlled, utilizing Carbon Capture with Transport and Sequestration for the Melting Furnace is found to be economically infeasible.

Energy Efficiency Measures

Roxul will implement unique process improvements with a focus on energy efficiency. The Melting Furnace is the most energy intensive unit operation in the facility, and as such, the process design maximizes the use of energy input.

Recycled wool waste can be remelted in the furnace without briquetting. Direct material input removes additional any energy requirements for briquetting and energy consumption will be further reduced because wool requires less energy to re-melt than raw materials. The furnace is able to utilize raw materials that do not exist in lump form, e.g., waste from production, thus saving virgin raw materials and reducing waste that would otherwise go to a landfill.

Table D-9-2 includes a list of energy efficiency measures that are applicable to the Melting Furnace, along with a description of the energy efficiency measures and proposed methods for implementation.

Table D-9-2 Melting Furnace Energy Efficiency Measures

Energy Efficiency Measure	Description	Proposed Implementation
Refractory Material Selection	The refractory material lining the Melting Furnace is the primary insulating material.	The Melting Furnace will be lined on the inside with a special refractory which maintains the heat in the combustion zone and minimizes heat transfer losses to the steel jacket and cooling water.
Use of Recycled Materials to Reduce Energy Demand	Recycled wool waste materials can melt at a lower temperature thus reducing the fuel energy demand.	Recycled wool will save raw materials in addition to demanding less energy to melt. Decomposition of carbonates to CO_2 will be reduced.
Heat Recovery from Process Streams	Exhaust streams with significant amounts of heat energy can be recovered for other heating purposes.	Multiple heat integration plans will be implemented using the unused heat from the melting process, such as: Hot off gas from melting is heat exchanged with Melting Furnace incoming air. Heat loss in Melting Furnace cooling water will be utilized to heat factory and office buildings, for domestic hot water.
Use of Preheaters	Preheaters allow higher energy transfer efficiency and lower fuel requirements.	Air to the Melting Furnace will be pre-heated.
Furnace Design	An excess of oxygen allows for the conversion of organic pollutants to CO_2, which possesses the lowest global warming potential.	The melt process is an oxidizing process, which operates with an excess of oxygen.
O_2 Enrichment	O_2 enrichment could increase combustion	O_2 enrichment will be used in the

Energy Efficiency Measure	Description	Proposed Implementation
	efficiency, reduce exhaust gas volume, and reduce available N_2 that may form NOx.	melting process to optimize complete combustion.

RBLC entries for various combustion sources were reviewed. These entries support a CO_2e emission limit basis of tpy or tpy rolling 12-month. A rolling 12-month basis is appropriate because there is no ambient air quality driver for reducing the averaging period for GHGs.

Step 5 - Selection of BACT

For CO_2e emissions generated from the Melting Furnace, BACT is selected to be the implementation of energy efficiency measures identified in Step 4. Energy efficiency measures are the only remaining technically and economically feasible control option for minimizing CO_2 emissions from the Melting Furnace. No adverse energy, environmental, or economic impacts are associated with the selected control option. The proposed numerical BACT emission limits are shown in Attachment O.

D.9.5 GHG BACT Determination For Natural Gas Combustion Units

CO_2e emissions from combustion units identified below will result from the combustion of natural gas. In a properly tuned boiler, heater, or oven, nearly all of the fuel carbon in natural gas is converted to CO_2 during the combustion process. This conversion is relatively independent of combustor type. Unconverted fuel carbon results in emissions of CH_4, CO, and/or other VOC emissions due to incomplete combustion. Even boilers and heaters operating with poor combustion efficiency produce insignificant amounts of CH_4, CO, and VOC compared to CO_2 levels. Thus, the following control analysis focuses on CO_2 emissions. The following sources utilize natural-gas fired burners and have been grouped together to streamline this GHG analysis:

- Pre-heat burner (IMF24)
- Curing Oven Burners (HE01, Curing Oven Afterburner, Curing Oven Circulation Burner #1, and Curing Oven Circulation Burner #2)
- Product Marking (P_Mark)
- High Oven A (RFNE3)
- High Oven B (RFNE9)
- Drying Oven 1 (RFNE4)
- Drying Oven 2 & 3 (RFNE6)
- Natural Gas Boiler 1 (CM03)
- Natural Gas Boiler 2 (CM04)
- RFN Building Heat (RFN10)

Exhibit L

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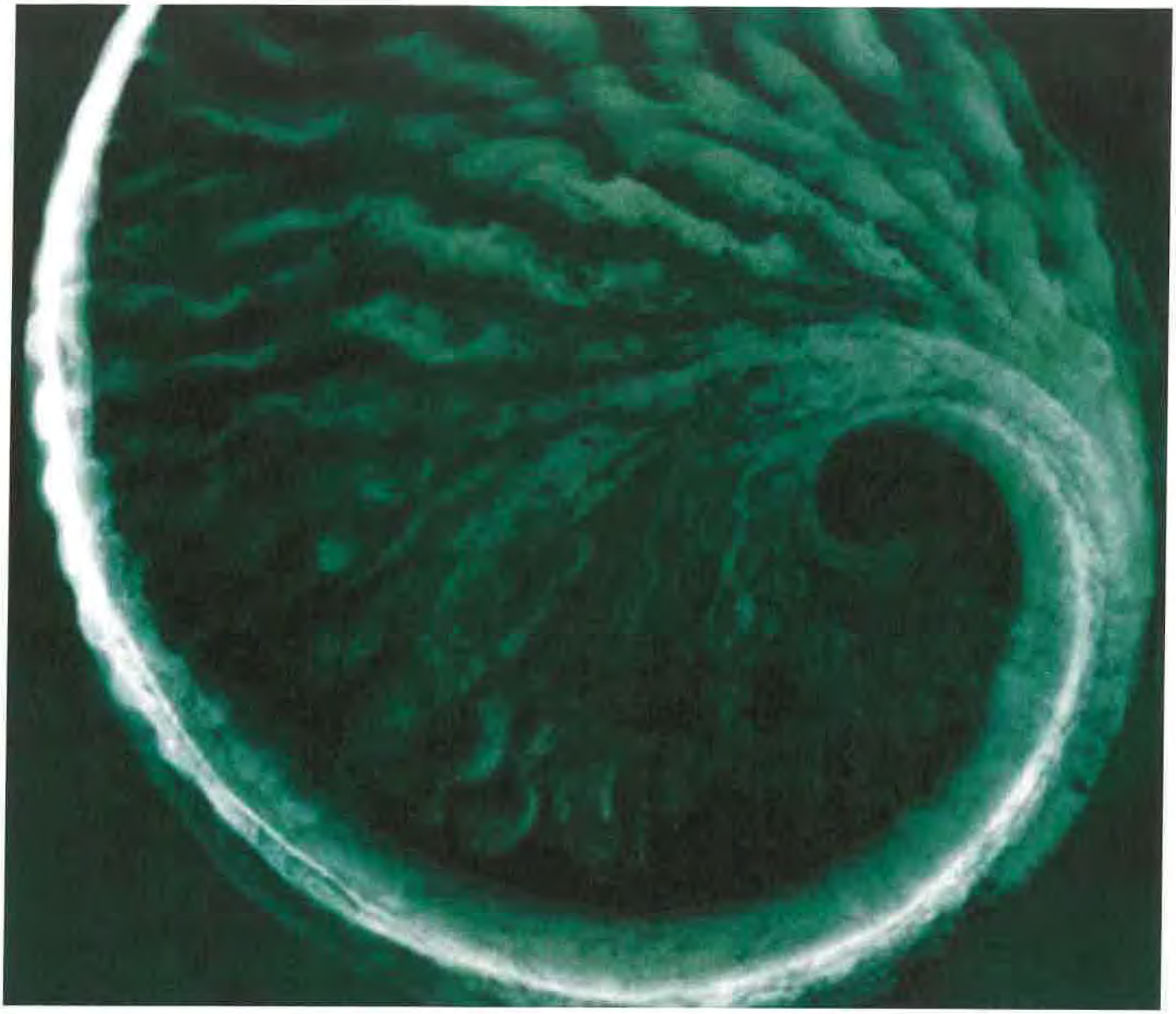

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Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

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*): **IMF01**

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

   Melting Furnace

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:

   Mineral Inputs (Claimed Confidential) – Charge Rate Claimed Confidential

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

   Melted Mineral – Melt Rate Claimed Confidential

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

   The chemical reactions from the Melting Furnace are caused by the combustion of the raw material inputs. These combustion reactions are generally considered well known and for this reason are not included.

* 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:

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

NA

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

21,414 scfm (33,900 Nm^3/hr)	@	**3,000**	°F and	**14.7**	psia.

(d) Percent excess air:

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

(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:

TBD

(g) Proposed maximum design heat input: **Claimed Confidential** × 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:			
@ **301.73** °F and		**14.7** psia	
a. NO_X	**37.37**	lb/hr	grains/ACF
b. SO_2	**33.63**	lb/hr	grains/ACF
c. CO	**11.21**	lb/hr	grains/ACF
d. PM_{10}	**8.22**	lb/hr	grains/ACF
e. Hydrocarbons	--	lb/hr	grains/ACF
f. VOCs	**11.66**	lb/hr	grains/ACF
g. Pb	**<0.01**	lb/hr	grains/ACF
h. Specify other(s)			
Total HAPs	**3.43**	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
See proposed monitoring in Attachment O.	**See proposed recordkeeping in Attachment O.**
REPORTING	TESTING
See proposed reporting in Attachment O.	**See proposed testing in Attachment O.**

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

NA

Attachment L
Emission Unit Data Sheet
(INDIRECT HEAT EXCHANGER)

Emission Unit ID No. must match List Form): **CO**

Control Device ID No. (must match List Form): **CO-AB, HE01**

Equipment Information

1. Manufacturer: **TBD**	2. Model No. **Custom** Serial No.
3. Number of units: **Claimed Confidential**	4. Use: **Direct-fired unit - Provide heat for the curing process.**
5. Rated Boiler Horsepower: **NA** hp	6. Boiler Serial No.: **NA**
7. Date constructed: **2018**	8. Date of last modification and explain: **NA**
9. Maximum design heat input per unit: **Claimed Confidential** $\times 10^6$ BTU/hr	10. Peak heat input per unit: **Claimed Confidential** $\times 10^6$ BTU/hr
11. Steam produced at maximum design output: **NA** LB/hr psig	12. Projected Operating Schedule: Hours/Day **24** Days/Week **7** Weeks/Year **52**
13. Type of firing equipment to be used: ☐ Pulverized coal ☐ Spreader stoker ☐ Oil burners ☒ Natural Gas Burner ☐ Others, specify	14. Proposed type of burners and orientation: ☐ Vertical ☐ Front Wall ☐ Opposed ☐ Tangential ☐ Others, specify
15. Type of draft: ☐ Forced ☐ Induced	16. Percent of ash retained in furnace: %
17. Will flyash be reinjected? ☐ Yes ☐ No	18. Percent of carbon in flyash: %

Stack or Vent Data

19. Inside diameter or dimensions: **12.96** ft.	20. Gas exit temperature: **104** °F
21. Height: **213.25** ft.	22. Stack serves: ☐ This equipment only ☒ Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent) **HE01, CO-AB, CO, SPN, and CS**
23. Gas flow rate: **369,528.94** ft^3/min	
24. Estimated percent of moisture: %	

Fuel Requirements

25. Type	Fuel Oil No.	Natural Gas	Gas (other, specify)	Coal, Type:	Other:
Quantity (at Design Output)	gph@60°F	**Claimed Confidential** ft^3/hr	ft^3/hr	TPH	
Annually	$\times 10^3$ gal	**Claimed Confidential** $\times 10^6$ ft^3/hr	$\times 10^6$ ft^3/hr	tons	
Sulfur	Maximum: wt. % Average: wt. %	gr/100 ft^3	gr/100 ft^3	Maximum: wt. %	
Ash (%)				Maximum	
BTU Content	BTU/Gal. Lbs/Gal.@60°F	**1026** BTU/ft^3	BTU/ft^3	BTU/lb	
Source					
Supplier					
Halogens (Yes/No)					
List and Identify Metals					

26. Gas burner mode of control:
☐ Manual ☐ Automatic hi-low
☐ Automatic full modulation ☐ Automatic on-off

27. Gas burner manufacture: **TBD**

28. Oil burner manufacture: **NA**

29. If fuel oil is used, how is it atomized? ☐ Oil Pressure ☐ Steam Pressure ☐ Compressed Air ☐ Rotary Cup ☐ Other, specify

30. Fuel oil preheated: ☐ Yes ☐ No

31. If yes, indicate temperature: °F

32. Specify the calculated theoretical air requirements for combustion of the fuel or mixture of fuels described above actual cubic feet (ACF) per unit of fuel:
@ °F, PSIA, % moisture

33. Emission rate at rated capacity: lb/hr

34. Percent excess air actually required for combustion of the fuel described: %

Coal Characteristics

35. Seams: **NA**

36. Proximate analysis (dry basis): % of Fixed Carbon: % of Sulfur:
% of Moisture: % of Volatile Matter:
% of Ash:

Emissions Stream

37. What quantities of pollutants will be emitted from the boiler before controls?

Pollutant	Pounds per Hour lb/hr	grain/ACF	@ °F	PSIA
CO	**No Controls – See Below**			
Hydrocarbons				
NO_x				
Pb				
PM_{10}				
SO_2				
VOCs				
Other (specify)				

38. What quantities of pollutants will be emitted from the boiler after controls?

Pollutant	Pounds per Hour lb/hr	grain/ACF	@ °F	PSIA
CO	**1.65**			
Hydrocarbons				
NO_x	**13.23**			
Pb				
PM_{Fil}	**1.50**			
PM_{10}	**1.50**			
$PM_{2.5}$	**0.6**			
SO_2	**<0.01**			
VOCs	**1.50***			
Other (specify)				

*Includes non-HAP VOCs only – Organic HAP emissions are quantified as a combined limit – See Appendix A

39. How will waste material from the process and control equipment be disposed of?

Wastes are not expected from a natural gas-fired unit.

40. Have you completed an *Air Pollution Control Device Sheet(s)* for the control(s) used on this Emission Unit.

41. Have you included the ***air pollution rates*** on the Emissions Points Data Summary Sheet? **Yes**

42. **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 PLAN: Please list (1) describe the process parameters and how they were chosen (2) the ranges and how they were established for monitoring to demonstrate compliance with the operation of this process equipment operation or air pollution control device.

See proposed monitoring plan in Attachment O.

TESTING PLAN: Please describe any proposed emissions testing for this process equipment or air pollution control device.

See proposed testing plan in Attachment O.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

See proposed recordkeeping plan in Attachment O.

REPORTING: Please describe the proposed frequency of reporting of the recordkeeping.

See proposed reporting plan in Attachment O.

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

Exhibit M

Department of Military Affairs and Public Safety
Cabinet Secretary Jeff S. Sandy, CFE, CAMS
State Fire Marshal Kenneth E. Tyree, Jr.

Phone: (304) 558-2191 Fax: (304) 558-2537

OFFICE OF THE STATE FIRE MARSHAL
1207 Quarrier St, 2nd Floor
Charleston, WV 25301
www.firemarshal.wv.gov

04-10-18

Date Received: 03-29-18
Date Reviewed: 04-10-18
Document No: 2018-PR21814

Michel Lebel / Allen & Hoshall
1661 International Dr. Suite 100
Memphis, TN. 38120

Re: Rockwool Ran 5 Facility – 30% Design Set
Jefferson County / 365 Granny Smith Lane, Kearneysville, WV. 25430
Arch / Industrial Type Const. II 000 Stories: Various Heights SF: Total Bldgs. 550,000 S.F.

Dear Mr. Michel Lebel,

The plans for the referenced project have been reviewed. This review relates to State Fire Code requirements only. It does not address Building Code or ADA requirements. This review procedure is **NOT AN APPROVAL** and does not relieve the owner, architect or engineer of responsibility. Project approval is only given after Final Inspection for Occupancy.

The above referenced project has been reviewed and the plans, as submitted, appear to meet the West Virginia State Fire Code. The following comments apply:

1. This Review was done on a 30% Design Set of Plans. !00 % Completed Plans will be submitted at a later date.
2. Fire Alarm System Contractor is to submit Fire Alarm System Plans for review when completed.
3. Sprinkler System Contractor is to submit Sprinkler System Plans for review when completed.
4. Any construction revisions making changes to exiting, major mechanical and electrical plans prior to and during construction shall be submitted to this office for review.
5. Two weeks prior to completion, please notify the Inspection Division at ext. 53214. **All review fees must be paid before final inspection.**
6. The review fee for this project is $0.00. This is not a complete review. Review fee will be charged when 100 % completed plans are reviewed.

Review fee includes all construction inspections, final inspections, and the occupancy permit.
All electrical work must be done by West Virginia Licensed Electricians.
Should you have any further questions about this or other projects that would be serviced by this office, contact me at 304-558-2191, ext. 53218.

Yours for better fire protection,

Clyde Cummings

Clyde Cummings
Fire Safety Plans Examiner Supervisor
CAC/mi
Cc: File, Inspection, Owner

PLANS & REVIEW
FACT SHEET

Project:	ROCKWOOL RAN5 FACILITY 30% DESIGN SET
Address:	365 GRANNY SMITH LANE KEARNEYSVILLE,
County:	JEFFERSON
Occupancy:	INDUSTRIAL
Plan Type:	ARCHITECTURAL
Date Received:	3/30/2018
Date Reviewed:	4/9/2018
Submitter:	ALLEN & HOSHALL 1661 INTERNATIONAL DRIVE, SUITE 100 MEMPHIS, TN 38120- (901) 820-0820
	Flats: 0 ***Rolls:*** 1 ***CD's:*** *0*
Invoice Number:	PR21814
Amount Billed:	$0.00
Reviewer:	CUMMINGS, CLYDE
Estimated Cost:	$0.00
Memo:	NO CHARGE - 30% DONE - BILLING WILL BE DONE AT A LATER DATE

RECEIVED
SFMO

PLAN REVIEW

PLANS & REVIEW
FACT SHEET

☐ Resubmittal
☐ POC

Project: Rockwool Ran 5 Facility 30% Design Set
Address: 365 Granny Smith Lane
City: Kearneysville 25430
County: Jefferson
Occupancy: Industrial
Plan Type: ARCH
Date Received: 3/30/18

Date Reviewed: 04-09-18

Submitter: Allen + Hoshall Michael Lebel
Phone No.: 901.820.0820
Owner: Udel International Drive Ste 100 Memphis TN 38120
Flats: **Rolls:** 1 **CD:**

Invoice Number: PR21814

Amount Billed: $0.00 Billing will be done at A later Date. This set is only 30% Done.

Reviewer: Chyle

Estimated Cost:

Invoice To:

Memo: 30% Design Set

SFMO

PLAN REVIEW

Received
SFMO
APR 09 2018
CAC
Plan Review

Department of Military Affairs and Public Safety
Cabinet Secretary Jeff S. Sandy, CFE, CAMS
State Fire Marshal Kenneth E. Tyree, Jr.

Phone: (304) 558-2191

Fax: (304) 558-2537

OFFICE OF THE STATE FIRE MARSHAL
1207 Quarrier St, 2nd Floor
Charleston, WV 25301
www.firemarshal.wv.gov

ARCHITECTURAL

Resubmittal: __Yes __No
Prior Walk-In Review: __Yes __No
Plan of Corrections: __Yes __No

NOTE: ALL BLANKS MUST BE COMPLETED OR PLAN REVIEW MAY BE DELAYED UNTIL ALL INFORMATION IS RECEIVED.

Project Name: ROCKWOOL RAN 5 FACILITY - 30% DESIGN SET

Street Address: ~~8880~~ 365 GRANNY SMITH LANE

City: ~~RANSOM~~ KEARNEYSVILLE Zip: ~~25411~~ 25430 County: JEFFERSON

Owner: ROCKWOOL
Mailing Address: 4594 CAYCE RD
City: BYHALIA State: MS Zip: 38611

Plans Submitter: MICHEL LEBEL | ALLEN & HOSHALL Phone: 901.820.0820
Address: 1661 INTERNATIONAL BLVD SUITE 100
City: MEMPHIS State: TN Zip: 38120

Approx. date of start: JUNE 2018 Is the building sprinklered: ✓Yes __No PARTIAL

Occupancy Type (as defined by NFPA 101, Life Safety Code): INDUSTRIAL OCCUPANCY - SPECIAL PURPOSE

Total Square Footage: APPROX 550,000 SF Plans submitted on CD: __Yes ✓No

Estimated Construction Cost: ?

Name: MICHEL LEBEL Signature: [signature]

Bill Invoice To: I DISCUSSED WITH CLYDE CUMMINGS THAT THE REVIEW FEE WOULDN'T BE CHARGED UNTIL THE PERMIT SET IS ISSUED. THIS IS JUST A 30% REVIEW

REVIEW FEE INCLUDES ALL CONSTRUCTION INSPECTIONS, FINAL INSPECTION AND THE OCCUPANCY PERMIT.

ONE SET OF PLANS AND SPECIFICATIONS REQUIRED – ADDITIONAL SETS WILL BE RETURNED UPON REQUEST IF SHIPPING AND BILLING INFORMATION IS PROVIDED.

Department of Military Affairs and Public Safety
Cabinet Secretary Jeff S. Sandy, CFE, CAMS
State Fire Marshal Kenneth E. Tyree, Jr.

Phone: (304) 558-2191 Fax: (304) 558-2537

OFFICE OF THE STATE FIRE MARSHAL
1207 Quarrier St. 2nd Floor
Charleston, WV 25301
www.firemarshal.wv.gov

04-10-18

Date Received: 03-29-18
Date Reviewed: 04-10-18
Document No:

Michel Lebel / Allen & Hoshall
1661 International Dr. Suite 100
Memphis, TN. 38120

Re: Rockwool Ran 5 Facility – 30% Design Set
Jefferson County / 365 Granny Smith Lane, Kearneysville, WV. 25430
Arch / Industrial Type Const. II 000 Stories: Various Heights SF: Total Bldgs. 550,000 S.F.

Dear Mr. Michel Lebel,

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The above referenced project has been reviewed and the plans, as submitted, appear to meet the West Virginia State Fire Code. The following comments apply:

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6. The review fee for this project is $0.00. This is not a complete review. Review fee will be charged when 100 % completed plans are reviewed.

Review fee includes all construction inspections, final inspections, and the occupancy permit.
All electrical work must be done by West Virginia Licensed Electricians.
Should you have any further questions about this or other projects that would be serviced by this office, contact me at 304-558-2191, ext. 53218.

Yours for better fire protection,

Clyde Cummings

Clyde Cummings
Fire Safety Plans Examiner Supervisor
CAC/mi
Cc: File, Inspection, Owner

Department of Military Affairs and Public Safety
Cabinet Secretary Jeff S. Sandy, CFE, CAMS
State Fire Marshal Kenneth E. Tyree, Jr.

Phone: (304) 558-2191 Fax: (304) 558-2537

OFFICE OF THE STATE FIRE MARSHAL
1207 Quarrier St, 2nd Floor
Charleston, WV 25301
www.firemarshal.wv.gov

June 8, 2018

Michael Lebel
1661 International Drive, Suite 100
Memphis, TN 38120

Re: Variance Request For:
Rockwool/Roxul USA
RAN 5 Facility
365 Granny Smith Lane
Kearneysville, WV 25430

Mr. Lebel,

Your request for a variance for the above facility has been approved. A copy will be sent to the local fire marshal, Assistant Fire Marshal Holben for his file.

Yours in fire safety

Joe Leake

Joe Leake, Deputy Fire Marshal

Cc: Fire Marshal Tyree
ASFM Holben
ASFM Armentrout
Clyde Cummings, Plans Review Supervisor
Central file

VARIANCE I.D. 2018-001

APPLICATION FOR VARIANCE TO
STATE FIRE CODE

DATE: APRIL 13, 2018

SUBMITTER: MICHEL LEBEL

STREET ADDRESS: 1661 INTERNATIONAL DRIVE, SUITE 100

CITY, STATE, ZIP: MEMPHIS TN 38120

ORGANIZATION REPRESENTED: ROCKWOOL / ROXUL USA

BUILDING: PLANT 5 FACILITY

OWNER OF BUILDING: ROCKWOOL / ROXUL USA

LOCATION: 365 GRANNY SMITH LANE, 25430 KEARNEYSVILLE, WV

Fire Safety Requirement: (State the specific firesafety requirement in question)

SPRINKLER PROTECTION IS REQUIRED FOR ANY BUILDING TYPE II-000 GREATER THAN 12,000 SF - SINGLE STORY AND 8,000 SF 2-STORY.

Variance Requested: (State the problem(s) and substantiation or justification for variance)

WE ARE REQUESTING A VARIANCE ON THE CODE SECTION OUTLINED ABOVE WHICH WOULD ALLOW A PORTION OF THE FACILITY TO NOT BE PROTECTED BY A SPRINKLER SYSTEM. THESE AREAS ARE IDENTIFIED AS B240, B300 & B400. SEE ATTACHED SUPPORTING DOCUMENTATION.

SIGNATURE OF SUBMITTER

MAIL TO: STATE FIRE MARSHAL'S OFFICE
1207 QUARRIER STREET, 2ND FLOOR
CHARLESTON WV 25301

RECEIVED
JUN 05 2018
INSPECTION AND
PLAN REVIEW DIVISION

VARIANCE I.D. _____

APPLICATION FOR VARIANCE TO
STATE FIRE CODE

DATE: APRIL 13, 2018

SUBMITTER: MICHAEL GEIGEL

STREET ADDRESS: 1661 INTERNATIONAL BLVD SUITE 100

CITY, STATE, ZIP: MEMPHIS TN 38150

ORGANIZATION REPRESENTED: ROCKWOOL / ROXUL USA

BUILDING: RAW 5 FACILITY

OWNER OF BUILDING: ROCKWOOL / ROXUL USA

LOCATION: 505 GRANNY SMITH LANE, 25430 KEARNEYSVILLE, WV

Fire Safety Requirement: (State the specific firesafety requirement in question)

SPRINKLER PROTECTION IS REQUIRED FOR ANY BUILDING TYPE II-000 GREATER THAN 12,000 SF - SINGLE STORY AND 8,000 SF 2-STORY.

Variance Requested: (State the problem(s) and substantiation or justification for variance)

WE ARE REQUESTING A VARIANCE ON THE 2015 SECTION BUILDING AREAS WHICH WOULD ALLOW A PORTION OF THE FACILITY TO NOT BE PROTECTED BY A SPRINKLER SYSTEM. THESE AREAS ARE IDENTIFIED AS BLDG 3300 & B400.

SEE ATTACHED SUPPORTING DOCUMENTATION

SIGNATURE OF SUBMITTER

MAIL TO: STATE FIRE MARSHAL'S OFFICE
1207 QUARRIER STREET, 2ND FLOOR
CHARLESTON WV 25301

VARIANCE REQUEST EVALUATION

FIRE MARSHAL'S OFFICE USE ONLY

VARIANCE REVIEWED BY Hyde Cummings PLANS REVIEW SECTION

DATE 04-27-18 SIGNED Hyde D. Cummings

COMMENTS This is the second Insulation Manufacturer that has applied for this type of variance. It is not a normally occupied space.

VARIANCE REVIEWED BY John D Holden ASSISTANT STATE FIRE MARSHAL

✓ APPROVED DISAPPROVED

DATE 6-5-18 SIGNED John D Holden

COMMENTS See No Problem with VARIANCE.

VARIANCE REVIEWED BY J. M. Armentrout FIRE MARSHAL II

X APPROVED DISAPPROVED

DATE 6/5/18 SIGNED J M A

COMMENTS As discussed and Reviewed within previously held meeting of the Stakeholders, I see no issue with granting.

VARIANCE REVIEWED BY _____ DEPUTY FIRE MARSHAL

APPROVED DISAPPROVED

DATE _____ SIGNED _____

COMMENTS _____

VARIANCE REQUEST EVALUATION

FIRE MARSHAL'S OFFICE USE ONLY:

DATE: April 19, 2018

SUBMITTER: Michael Lebel

ADDRESS: 1661 International Drive

CITY, STATE, ZIP: Memphis, TN 38120

VARIANCE: APPROVED ✓ DATE 6-6-18

TIME PERIOD FOR VARIANCE N/A

REJECTED _____ DATE _____

REASON FOR REJECTION _____

ORGANIZATION REPRESENTED: Rockwool/Roxul USA

BUILDING: RAN 5 Facility

OWNER OF BUILDING: Rockwool/Roxul USA

BUILDING LOCATION: 365 Granny Smith Lane, Kearneysville, WV 25430

STANDARD TITLE: State Fire Code STANDARD 87-1

PROPOSAL VARIANCE NO. 2018-001

VARIANCE REVIEWED BY: Clyde Cummings **PLANS REVIEW SECTION**

✓ APPROVED _____ REJECTED

DATE: 04-27-18 SIGNED: Clyde A. Cummings

COMMENTS: This is the second Insulation Manufacturer that has applied for this type of variance. It is not a normally occupied space.

VARIANCE REVIEWED BY: _____ **ASSISTANT STATE FIRE MARSHAL**

_____ APPROVED _____ REJECTED

DATE: _____ SIGNED: _____

COMMENTS: _____

VARIANCE REVIEWED BY: _____ **FIRE MARSHAL III**

_____ APPROVED _____ REJECTED

DATE: _____ SIGNED: _____

COMMENTS: _____

VARIANCE REVIEWED BY: Joe Leake **DEPUTY FIRE MARSHAL**

✓ APPROVED _____ REJECTED

DATE: 6-6-18 SIGNED: Joe Leake

COMMENTS: I agree with the above comments related to this request.

VARIANCE REVIEWED BY: Ken Tyree **STATE FIRE MARSHAL**

✓ APPROVED _____ REJECTED

DATE: 6-6-18 SIGNED: KTEE

COMMENTS: I agree with the review, recommendation & comments of our agency staff.

WEST VIRGINIA STATE FIRE MARSHAL'S OFFICE
PUBLIC EDUCATION DIVISION
1207 QUARRIER STREET, 2ND FLOOR
CHARLESTON, WV 25301
304-558-2191 EXT. 53223
304-558-2537 - FAX

Allen&Hoshall

TO: Office of the State Fire Marshall
Attn: Clyde Cummings
1207 Quarrier Street, 2nd Floor
Charleston, WV 25301

DATE: 4/17/2018
PROJECT: Variance Request for Ran 5 (Shuttle Project)
JOB NO.: 62565

We are sending you: ☒ Enclosed herewith ☐ Under separate cover

The following:

Spec. Section	Drawing no. Model no.	Designation	No. of copies	Description	Disposition
		O	1	Variance Request	FF

DESIGNATION

Drawing	D
Specification	SP
Shop Drawing	SD
Manf. Data	MD
Samples	SM
Other	O

DISPOSITION

For Your File or Use	FF
For Approval	FA
Reviewed	RV
Rejected	RJ
Revise and Resubmit	RR
Furnish as Corrected	FC
Approved	A

Sent by: Michel Lebel

Remarks:

1661 International Drive, Suite 100 Memphis, Tennessee 38120-1440 Phone 901.820.0820 Fax 901.683.1001

Variance Request
For
Ran 5 (Shuttle Project)
Ranson, West Virginia

Prepared for the
West Virginia State Fire Marshal
And
City of Ranson

Allen&Hoshall

1661 International Drive, Suite 100
Memphis, Tennessee 38120
Office 901.820.0820
Fax 901.683.1001
www.allenhoshall.com

April 13, 2018

State of West Virginia
Office of the State Fire Marshal
Attention: Mr. Ken Tyree
1207 Quarrier St.
Charleston, WV 25301

RE: Variance Application for Rockwool Manufacturing Facility
Ranson, WV

Dear Mr. Tyree,

On behalf of Rockwool, Allen & Hoshall is submitting a variance request for its new manufacturing facility located in Ranson, West Virginia.

Code:

According to the West Virginia State Fire Code, sprinkler protection is required for any building of Type II – 000 Construction which is greater than 12,000 SF for a single-story structure and greater than 8,000 SF for a 2-story structure. Any building with habitable or occupied spaces above 2 stories and up to 40 feet in height is required to have sprinkler protection, regardless of its square foot area.

Variance Request:

Rockwool requests a variance on the Code section outlined above which would allow a portion of the facility to not be protected by a sprinkler system. The areas of the facility for which Rockwool requests the sprinkler requirement variance are buildings identified as B240, B300, and B400. All three of these areas are above the square footage limits outlined in the WV State Fire Code. See supporting documentation for additional information regarding area and height.

We are providing the following information with this variance application to assist your review.

1. 30% Architectural Drawings of B240, B300, and B400 which contain floor plans, sections, and elevations.

2. A site plan showing the facility layout, building types, rated walls, areas, etc.

3. Hazardous materials list with stored and used quantities.

4. Process description of the areas in discussion – B240, B300, and B400

5. An ATEX report (European assessment of hazardous material and strategy) for all potential hazards in the facility.

Allen&Hoshall

6. An outline is being provided for B240, B300, and B400 (pages 47-71) to give a better description for all the building system designs.

We appreciate the opportunity to discuss this request for variance with your office. Please let us know if you have any questions or need additional information.

Sincerely,

Michel Lebel, AIA, NCARB, LEED AP

Allen&Hoshall

1661 International Drive, Suite 100
Memphis, Tennessee 38120
Office 901.820.0820
Fax 901.683.1001
www.allenhoshall.com

The following information provided below outlines additional measures/information in both building design and equipment process. This information is provided to assist the State Fire Marshal's office make a determination.

1. B240, B300, and B400 are structures that are all adjacent to each other and form spaces that are interconnected to support a continuous process from start to finish which makes separating the process difficult. It is the heart of the production line. Typical efforts to separate these spaces with rated wall/barriers would prove to be very difficult and detrimental to the process line.

2. B240, B300, and B400 are separated from the rest of the adjacent facility with 2-hour fire barriers (B520 Workshop and B500 Packaging) which is not required by code or NFPA. Rockwool is providing this separation as an additional life-safety safeguard. This would also provide separation between the non-sprinkled areas and sprinkled areas, if the variance request is approved.

3. The hazardous material usage in all three sections are below the MAQ. See provided hazardous material list with stored and used quantities per building.

4. All electrical and panel rooms in all three buildings shall be separated with a 1-hour fire barrier and will be protected with an Inergen fire suppression system which is gas based. All exposed wiring/cabling are fire resistant.

5. Standpipes, fire extinguishers, and hose reels will be provided to meet or exceed the life safety and local building code.

6. In B300, many of the areas are considered inhabitable/unoccupied which contain process equipment. The areas consider habitable/occupied (electrical rooms, control rooms, toilets, etc.) are below the elevation of 40 feet and will be provided with a 2-hour fire barrier made from concrete precast walls separating the furnace area from the occupied spaces.

7. The primary facility fire alarm panel will be housed in the guardhouse B180 which is staffed 24/7. This fire alarm panel will have central monitoring which will be monitored 24/7 by a third party to notify emergency dispatch.

8. The owner's insurance provider, Allianz, has reviewed the design and provided design input per their requirements. They have concluded that given the low fire load, the difficulties/challenges to sprinkle this area, and experience with past facilities that sprinklering this area would not be required for insurance coverage. Additional information and documentation can be provided from Allianz if required.

9. The occupant load for these buildings remains very low. B300 during production will be less than 5 occupants. B400 during production will be less than 8. B240 during production will be less than 3.

10. Heat detection is being provided in all spaces in B240, B300, and B400. Smoke detectors will be provided in all panel rooms and below all raised panel room floors.

Allen&Hoshall

1661 International Drive, Suite 100
Memphis, Tennessee 38120
Office 901.820.0820
Fax 901.683.1001
www.allenhoshall.com

RAN 5 Roxul
MSDA Review

American Core 2500 Impregnation oil
Location Stored B252 (outdoor storage/Containment)

No hazardous substance or complex substance
Flammable – Flash Point = >294 C – 561 F = above 200 F = **IIIB combustible liquid**
Extinguish method = use fog, foam, dry chemical, or carbon dioxide = no streams of water
NFPA Hazard ID = Health 0, flammability 1, reactivity 0

Storage: 35m3 = 35,000 liters = 9,246.02 gallons
Density: 0.9 kg/l
Closed system volume: 500l = 132.1 gallons

Code limits Stored/Close system = 13,200 gallons per controlled area – non sprinkled
26,400 gallons per control area in approved containers
Unlimited in sprinkled buildings
Code limits in open system = 3,300 gallons non sprinkled
Unlimited in sprinkled buildings

Paratherm NF – Heat Transfer Fluid
Location stored B300

No hazardous/complex substance
Flammable – Flash point 174 C = 345 F = Above 200 F = **IIIB combustible liquid**
No unusual fire or explosion hazard
CO2, Dry chemical or Foam. Water can be used to cool and protect exposed material
Do not use water jet as an extinguisher, this will spread fire

Storage: 45m3 = 11,888 gallons used in a close system

Code limits Stored/Close system = 13,200 gallons per controlled area – non sprinkled
26,400 gallons per control area in approved containers
Unlimited in sprinkled buildings
Code limits in open system = 3,300 gallons non sprinkled
Unlimited in sprinkled buildings

Chemtrade – Liquid Ammonium Sulfate
Location Stored B250

Nonflammable/NonCombustible
Low toxicity
Non Corrosive

Allen&Hoshall

Storage: 35 m3 = 35,000 liters = 9,246.02 gallons
Density: 1.2 kg/l
Closed system volume: 50l = 13.21 gallons
Closed system from B250 storage through outside pipe bridge and approx. 15m 1" pipe inside B300

Airgas – Aqua Ammonia Liquid (5-19.9%)
Location Stored B250

LD50 ORAL – Rate = 350 mg/kg
NFPA ID = Health 3, Flammability 0, Instability/Reactivity 0

LD50 ORAL- Rate = **toxic for levels 20 -500 mg/kg according to IBC/IFC = product is identified as Toxic**

Code limits Stored/Close system = 500 pounds of liquid – unsprinkled
Code limits Stored/Close system = 1000 pounds of liquid – sprinkled
Code limits Open system = 125 pounds of liquid – unsprinkled
Code limits Open system = 250 pounds of liquid – sprinkled

Storage: 35 m3 = 9,246.02 gallons – 35,000 liters x .9kg/l = 31,500 kg = 69,446 lb
Density: 0.9 kg/l
Closed system volume: 100l x .9kg/l = 90 kg = 198.42 lb

Closed system from B250 storage through outside pipe bridge and approx. 15m 1" pipe inside B300

Cargill – Corn Syrup - Dextrose
Location Stored B252

Nonflammable/Noncombustible
Non toxic
Non Corrosive

Storage: 2 tanks of each 50m3 = 100,000 liters = 26,417.21 gallons
Density: 1.35kg/l
Closed system volume: 200l = 52.83 gallons

Closed system from B252 storage underground to 10 feet from B300, through outside pipe bridge and approx. 100m 1" pipe inside B300 to day tank.

KO additive with hypo
Location Stored B250

Nonflammable/Noncombustible
Identifies as toxic but based on values the classification criteria is not meet
Non Corrosive

Allen&Hoshall

KX binder
Location Stored B250

Nonflammable/Noncombustible
Identifies as toxic but based on values the classification criteria is not meet IBC/IFC as toxic
Non Corrosive

Storage: 35m3 = 35,000 liters = 9,246.02 gallons
Density: 1.1 kg/l
Closed system volume: 100l = 26.42 gallons

Arclin – 72-7054P Resin

Liquid Phenol Formaldehyde Resin Solution
Flammable – Flash Point = >200 F = above 200 F = IIIB combustible liquid
Suitable extinguishing method = water, water fog, dry chemical, carbon dioxide
Self-contained breathing apparatus and full protective clothing must be worn in case of fire
NFPA = Health hazard 1, fire hazard 1,
No LD50 information listed.

Storage: 4 tanks each 50m3 = 50,000 liters = 13,208.60 gallons per tank x 4 tanks = 52,834 gallons
Density: 1.15 kg/l
Closed system volume: 200l = 52.83 gallons

Closed system from B250 storage through outside pipe bridge and approx. 15m 2" pipe inside B300

Code limits Stored/Close system = 13,200 gallons per controlled area – non sprinkled
26,400 gallons per control area in approved containers
Unlimited in sprinkled buildings
Code limits in open system = 3,300 gallons non sprinkled
Unlimited in sprinkled buildings

Wacker Silres BS 1042

Nonflammable/Noncombustible
Non toxic
Non Corrosive

Allen&Hoshall

Oil room (room no. 135-1.03):

Equivalent to 20 drums or 4400 liters of oil and oil products

Used oil room (room no. 135-1.08):

2000 liters of used oil .

3000 kg of oily waste (Rags and Cat-litter)

Paintroom (room no. 135-1.09):

25 gallons paint and thinner (90 liters) in max 5 gallon containers .

20 gallons of gasoline (75 liters) in 5 & 2 gallon containers .

ROCKWOOL International A/S
Group Technology

To:		**Date:**	07.03.2018
From:	Dan Lund Sørensen	**Ref.**	DLS
Copy:		**No.**	GT-18-#### Rev. 1

RAN5 (Shuttle) – Fire Variance Application – Process Description

1. B300 Furnace building

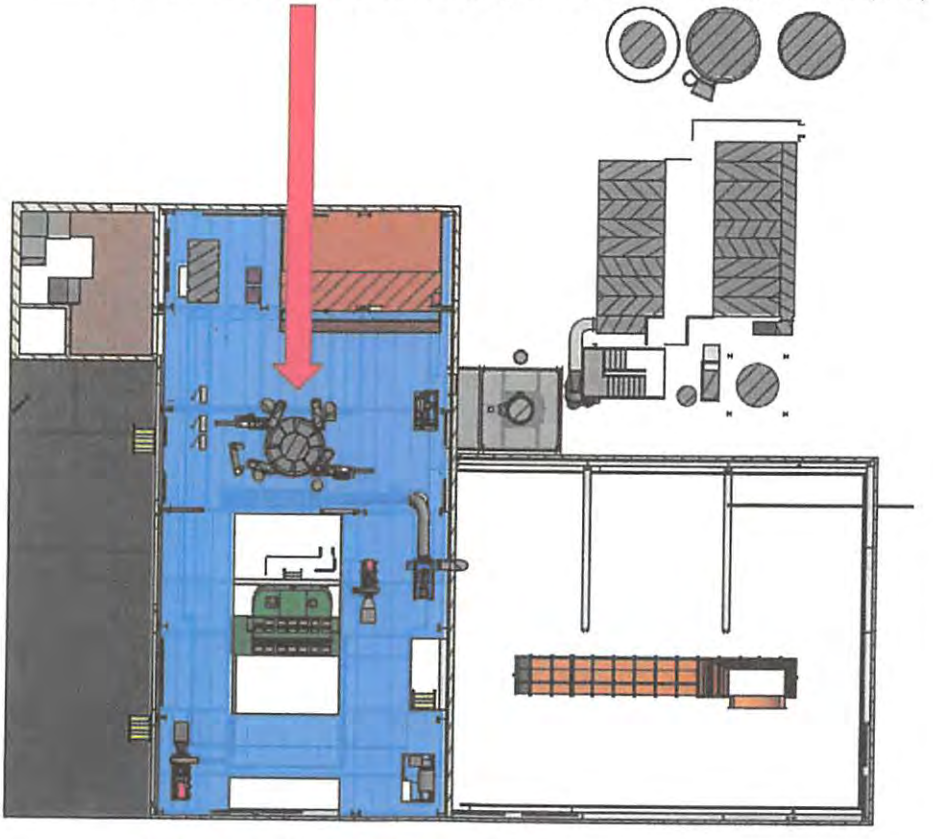
Main production processes:

- Melting of stone raw material and own production stonewool waste in a gas & coal fired furnace
- Spinning & collection of stonewool fibers by means of suction

The melting furnace have a total burner capacity up to 29.1 MW (99.4 MMBtu/hour) and a capacity to approx. 25 MT/hour at a temperature of 1500 °C (2750 F).

The burners are divided into 2 set of burners:

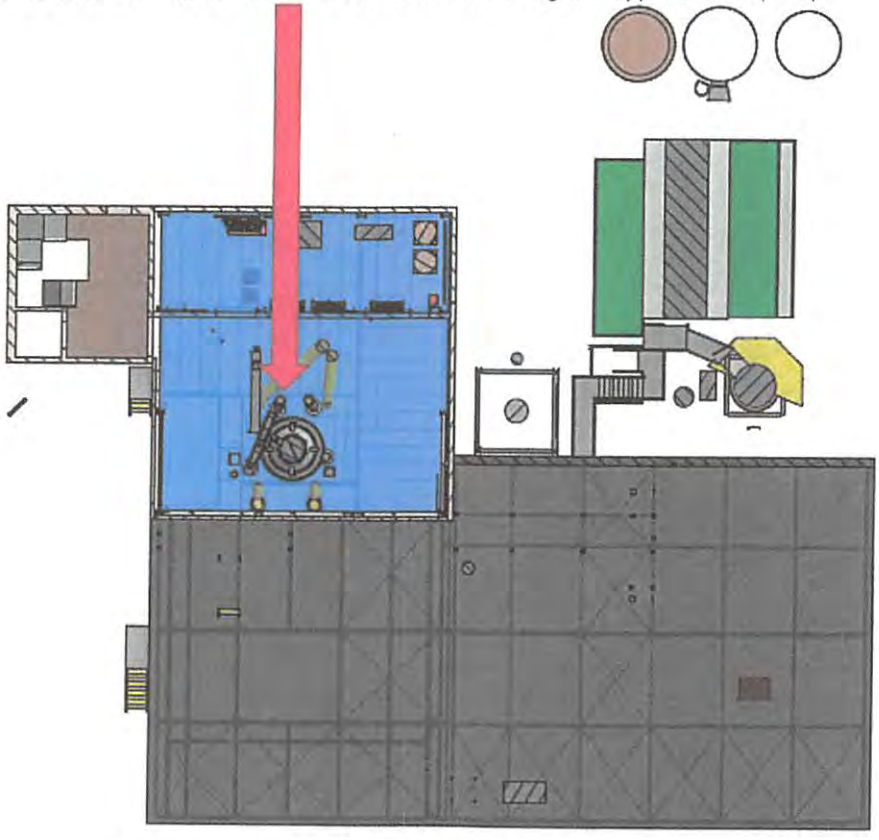
- 4 Oxy-fuel burners fueled by natural gas and operating with oxygen enriched air at a capacity up to 6.8 MW (23,2 MMBtu/hour), these burners are placed at a height of approx. 10 m (30 ft):



Steel floor TOS. +11200 & Roof TOS. +11650

Reference drawing L0398-0300 - **See Appendix 1**

- 5 coal burner fueled by coal powder and operating with pre-heated air a capacity up to 22.3 MW (76,2 MMBtu/hour), these burners are placed at a height of approx. 13 m (40 ft):



Steel floor TOS. +14350 & Roof TOS. +15650
Reference drawing L0398-0300 - **See Appendix 1**

The process of spinning & collection of stonewool fibers requires an air flow through the furnace building of more than 400,000 m3/hour (14 million cubic feet per hour).

The melting furnace is equipped with state of the art safety features and a classification document describes the considerations including references to the codes taken into account. **See appendix 4.**

The melting process with a high energy input combined with a very large air flow through the furnace building makes the use of sprinklers for fire extinguishing inefficient. The large amount of hot material & equipment could cause water from a sprinkling system to generate steam and thereby cause a danger to people trying to evacuate the building.

Additional fire preventive measures in B300:

- Monitoring of temperature of process air from collection chamber with automatic activated sprinklers in filter & ducting

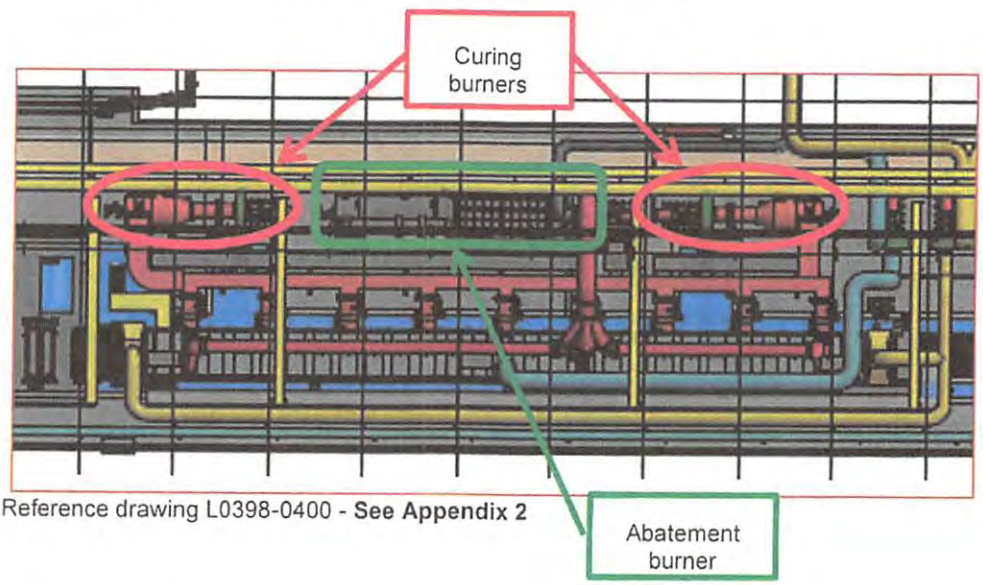
2. B400 Curing oven building

Main production processes:

- Curing of stonewool fibers in a tunnel oven at approx.250 °C (482 F) and thermal abatement (combustion) of off-gasses at up to 950 °C (1742 F).
- Cooling of stonewool fibers after the tunnel oven by mean s of air flow through the stonewool

The curing oven have a total of 3 burners with a capacity up to 5.4 MW (18.5 MMBtu/hour):

- 2 burners for curing the stonewool
- 1 burner for the abatement of off-gasses from the curing process



Reference drawing L0398-0400 - **See Appendix 2**

The process of curing and cooling of stonewool fibers requires an air flow through the curing oven building of more than 100,000 m3/hour (3.5 million cubic feet per hour).

The curing process with a high energy input combined with a large air flow through the curing oven building makes the use of sprinklers for fire extinguishing inefficient.

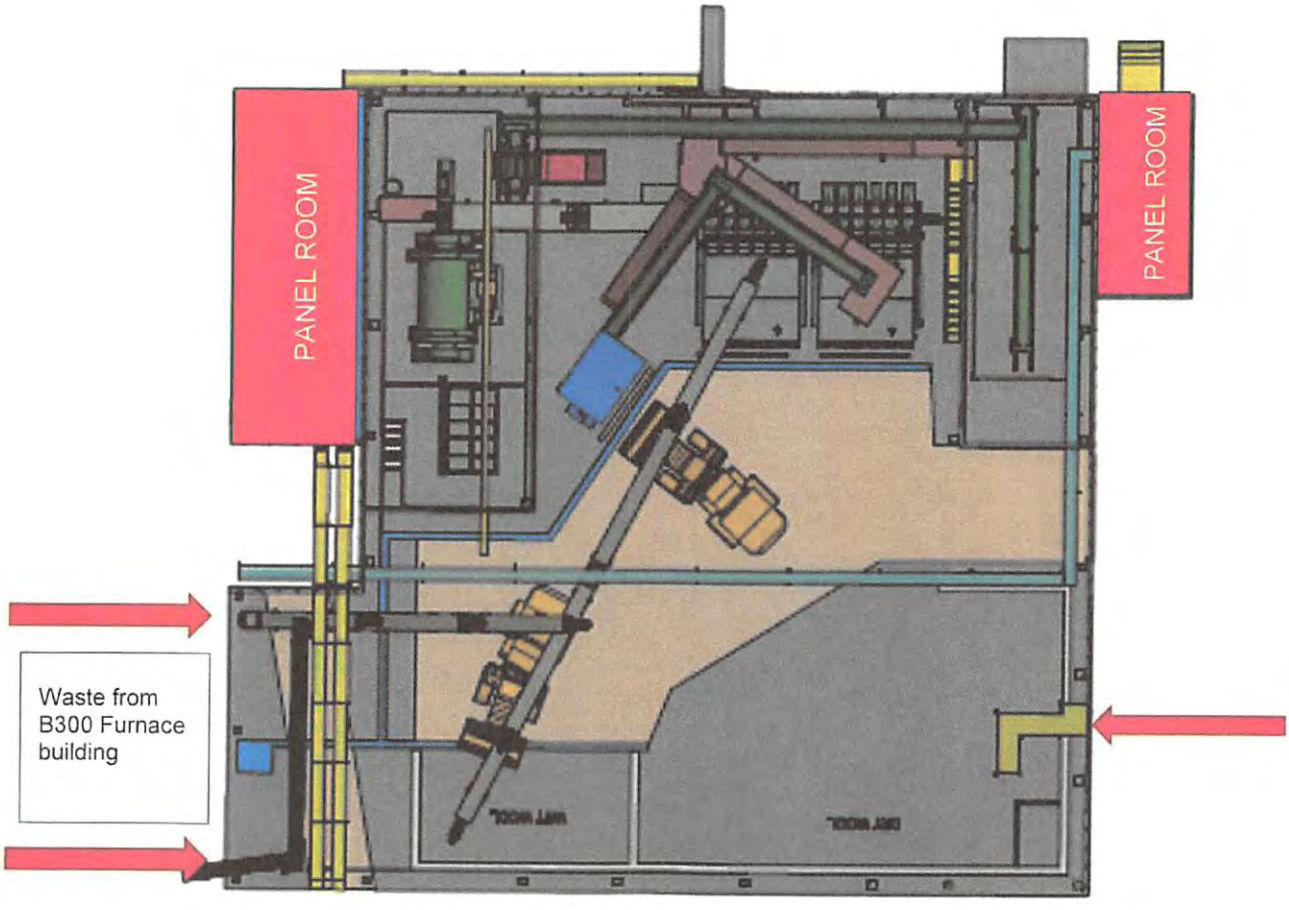
Additional fire preventive measures in B400:

- Monitoring of temperature of process air from curing oven & cooling zone chamber with automatic activated sprinklers in filter & ducting

3. B240 Wool waste recycling building

Main production processes:

- Milling of own production waste in order to re-melt the waste in the melting furnace
- Waste streams from B300 Furnace building and B400 Curing oven building are transported by conveyors systems into B240 Wool waste recycling building
- The milled waste is transported back to B300 Furnace building in a conveyor system
- 2 panel rooms, constructed with a 2 hour fire barrier
- B240 is an unheated building



Reference drawing L0398-0240 - **See Appendix 3**

The material stored and processed in B240 is either with a high moisture content or with a very low fire loads (cured stone wool material similar to our finished products). No wood or plastic waste is stored or processing in B240. All rooms/areas in B240 are equipped with smoke/heat detection system connected to the fire alarm system.

Due to low fire load and the material flow internally & into B240 then we do not find that sprinkling is providing additional safety compared to the operational issues related to flooding of an area with uncured wool. The sprinkler may cause B240 to be flooded and risk that wool waste with unsettled binder components to flood out of the building. Environmental measures are made to deal with such a situation, but the operational consequences of such an incident are severe and we do see some false alarm in B240 due to the front end loader operation inside the building.

Appendixes

1. Drawing L0398-0300 – B300 Furnace building

   L0398-0300.pdf

2. Drawing L0398-0400 – B400 Curing oven building

   L0398-0400.pdf

3. Drawing L0398-0240 – B240 Wool waste recycling building

   L0398-0240.pdf

4. RAN5 Classification Aquila (melting furnace)

   a. RAN5 Classification Aquila.pdf

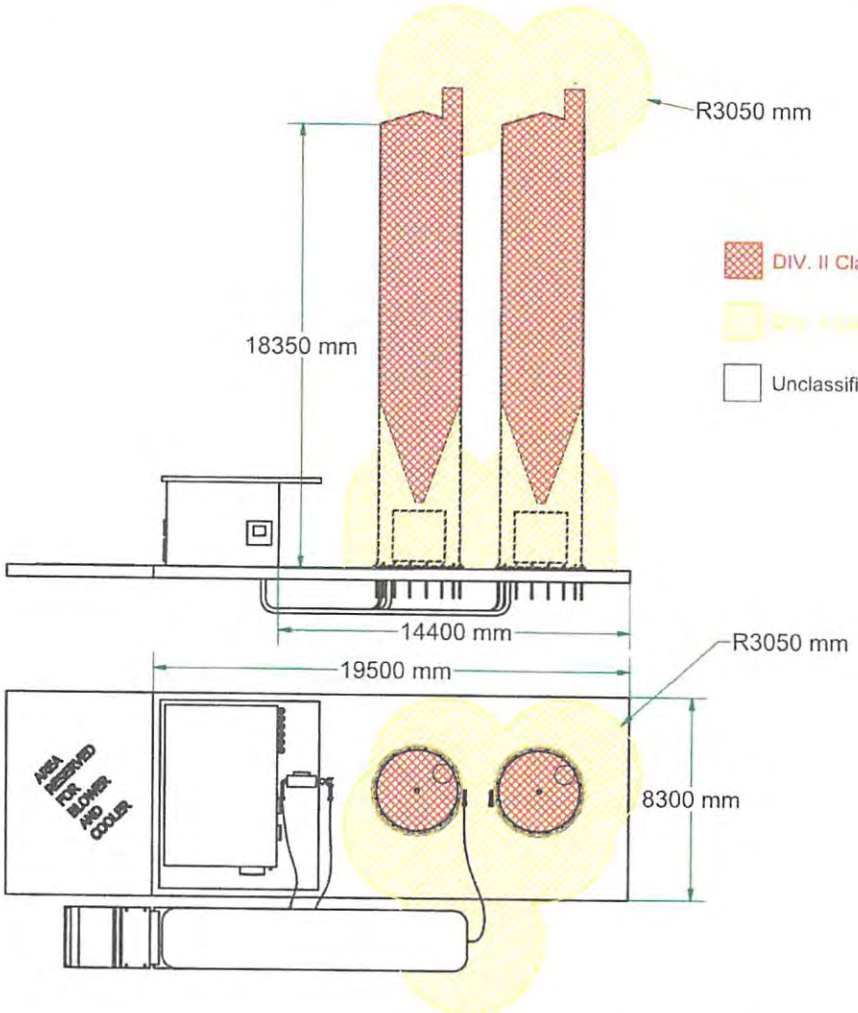
   b. K0398-1500.pdf

   c. R0398-0300-06.pdf

   d. R0398-0300-07.pdf

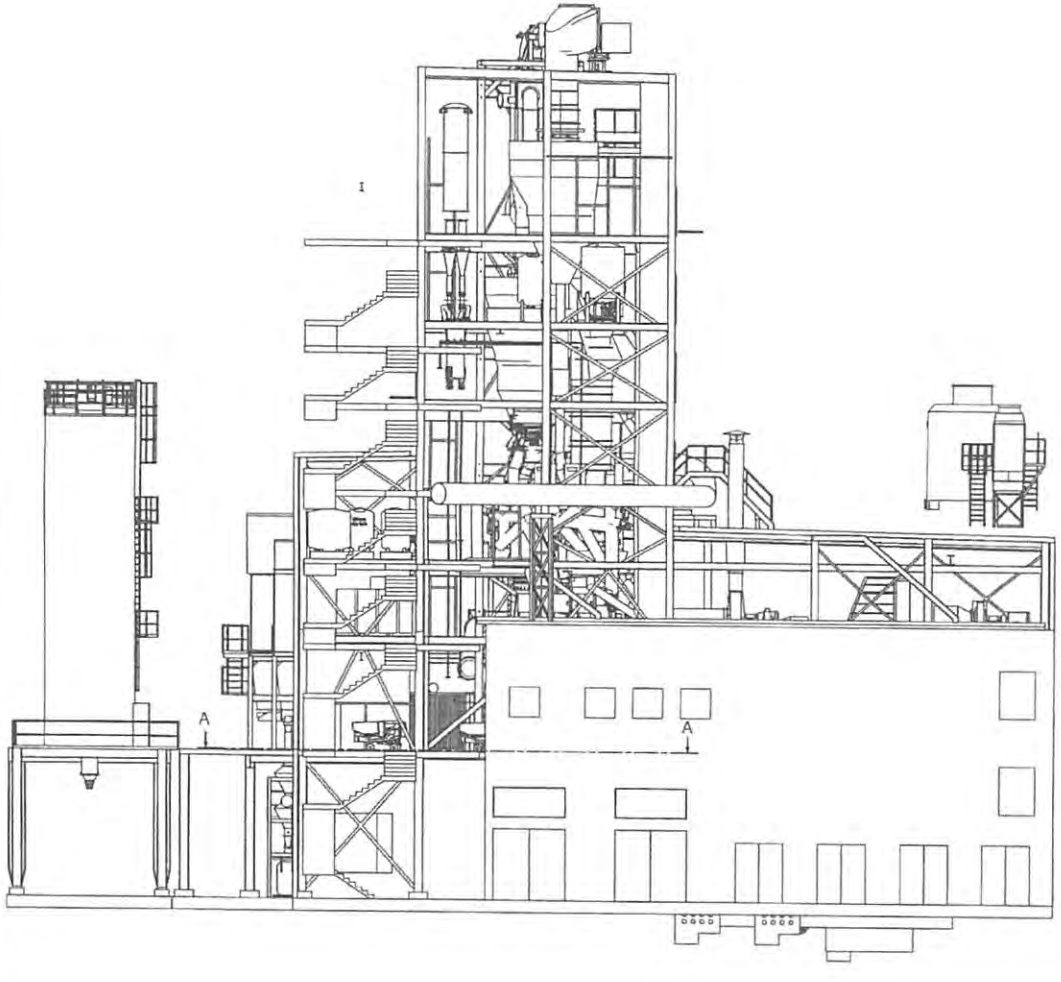
   e. R0398-0300-08.pdf

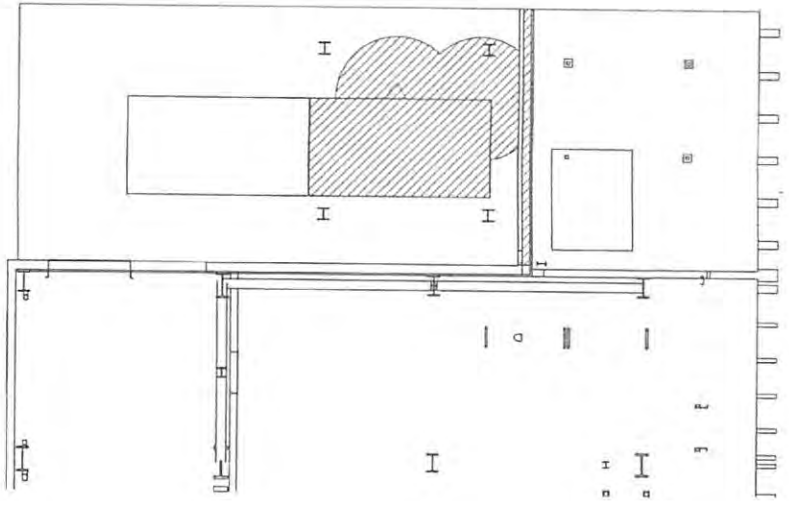
   f. R0398-0300-02.pdf



FACTORY LINE: RAN5	STATE: Work in Progress	SECURITY CATEGORY: Confidential	AUTHOR: 30-10-2017	SCALE:
ROCKWOOL® FIRESAFE INSULATION ROCKWOOL INTERNATIONAL A/S DK-2640 HEDEHUSENE DENMARK		DESCRIPTION: Zone classification coal storage		
This drawing must neither be passed on to any person not authorized by us to receive it, nor be copied or otherwise made use of by anybody without our permission.		SHEET SIZE	DRAWING NUMBER: K0398-1500	REV: A

FILE: C:\Vault Exp\RW_OPR_VC\WS\SHUTTLE (PR-10#00)\00 SITE & BUILDINGS\#238 COAL SILOS\K0398-1500.dwg





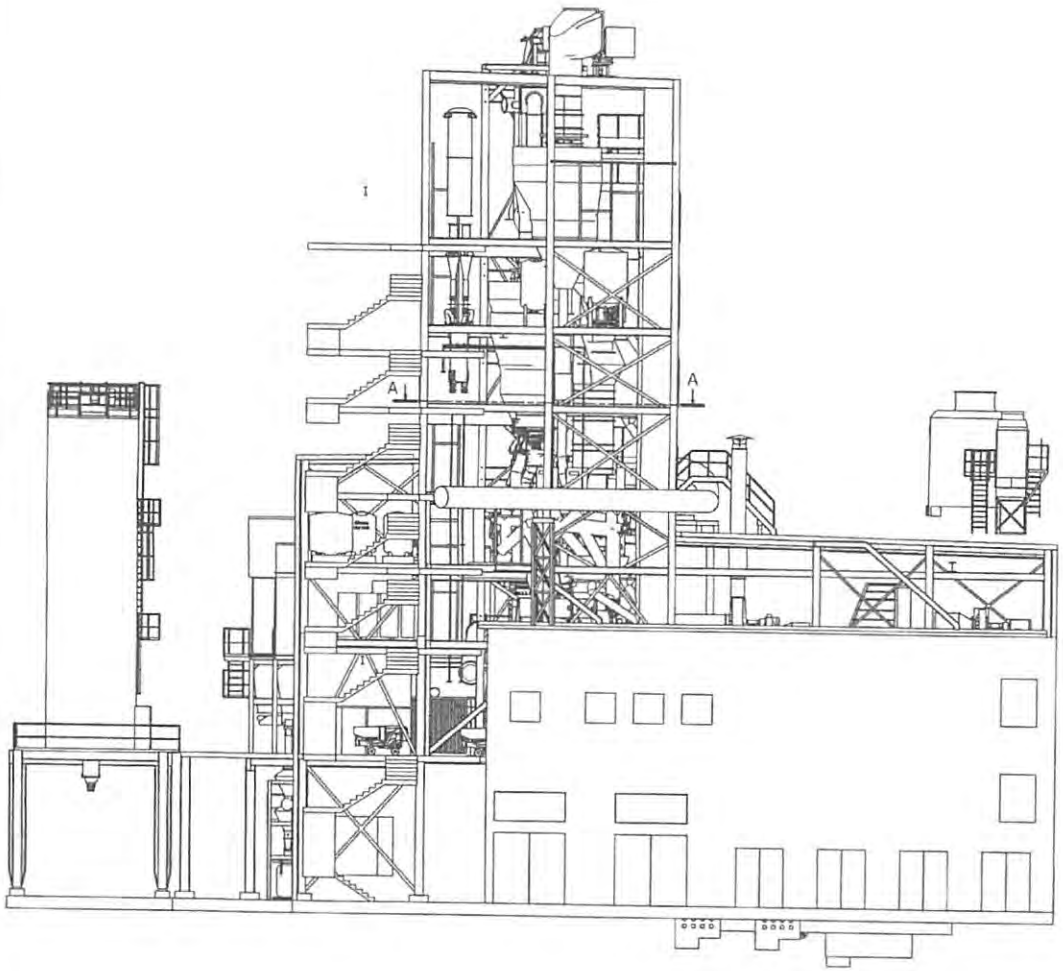
DIV. II Class 1

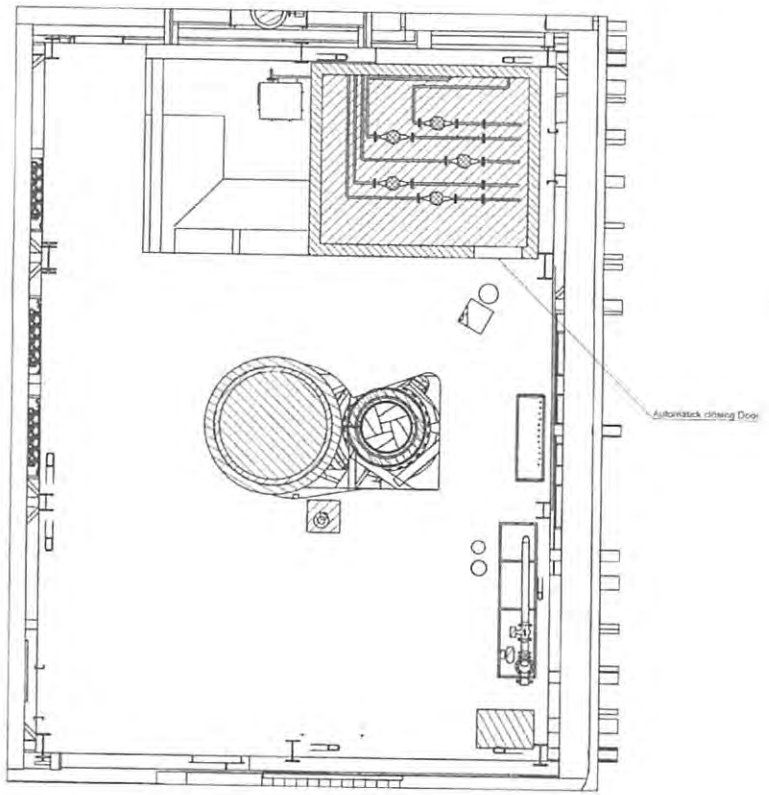
DIV. II Class 2

Unclassified

ROCKWOOL INTERNATIONAL A/S	Confidential	30-10-2017	
	B300 Hazardrooz Location Classification		
		R0398-0300-02	

1 2 3 4 5 6 7 8 9 10 11 12





DIV. II Class 1

DIV. II Class 2

Unclassified

Work in Progress	Confidential	30-10-2017	
ROCKWOOL	B300 Hazardous Location Classification		
		R0398-0300-06	A

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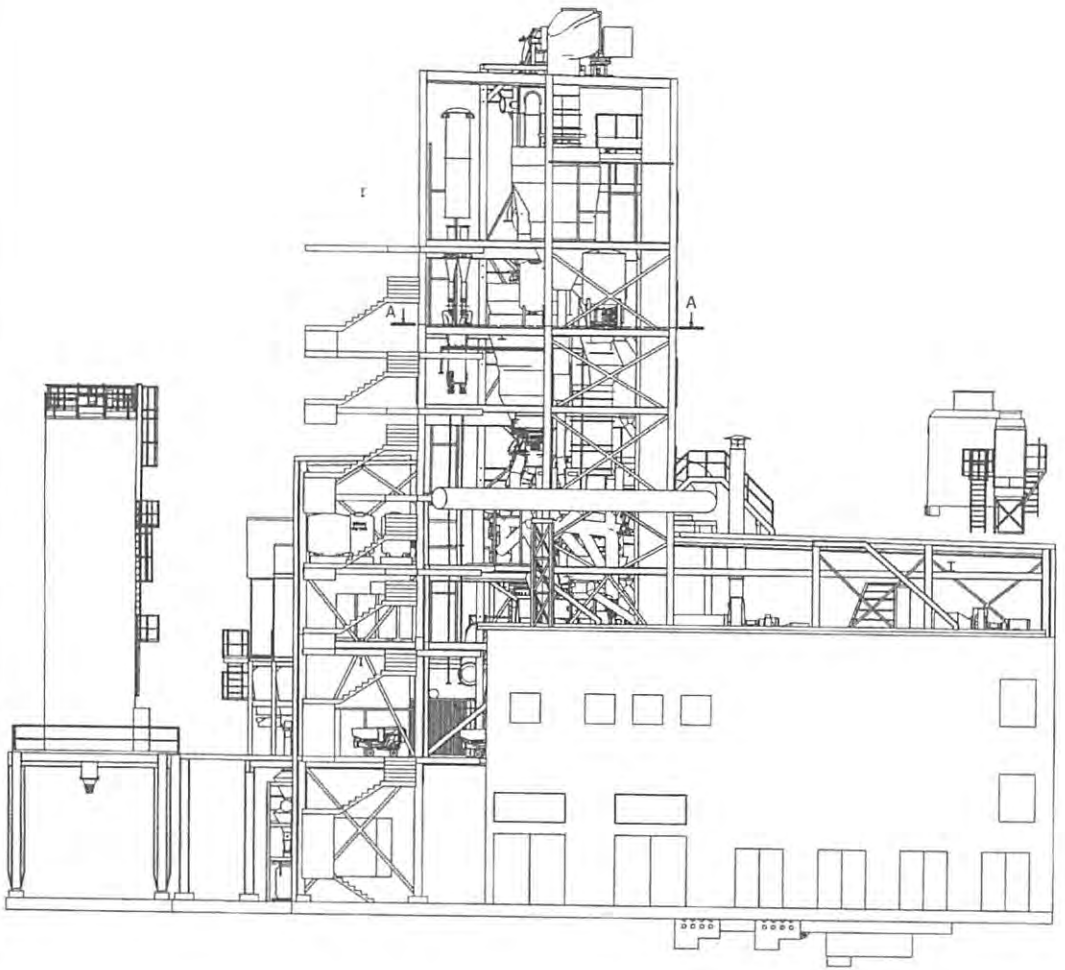
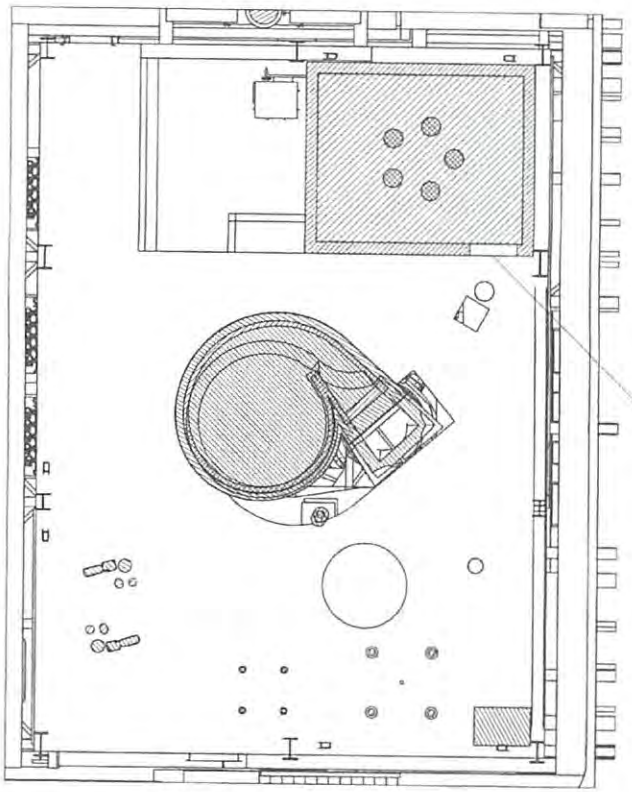


A-A



DIV. II Class 1

DIV. II Class 2

Unclassified

Work in Progress	Confidential	19-10-2017	
ROCKWOOL	B300 Hazardouz Location Classfication		
		R0398-0300-07	A

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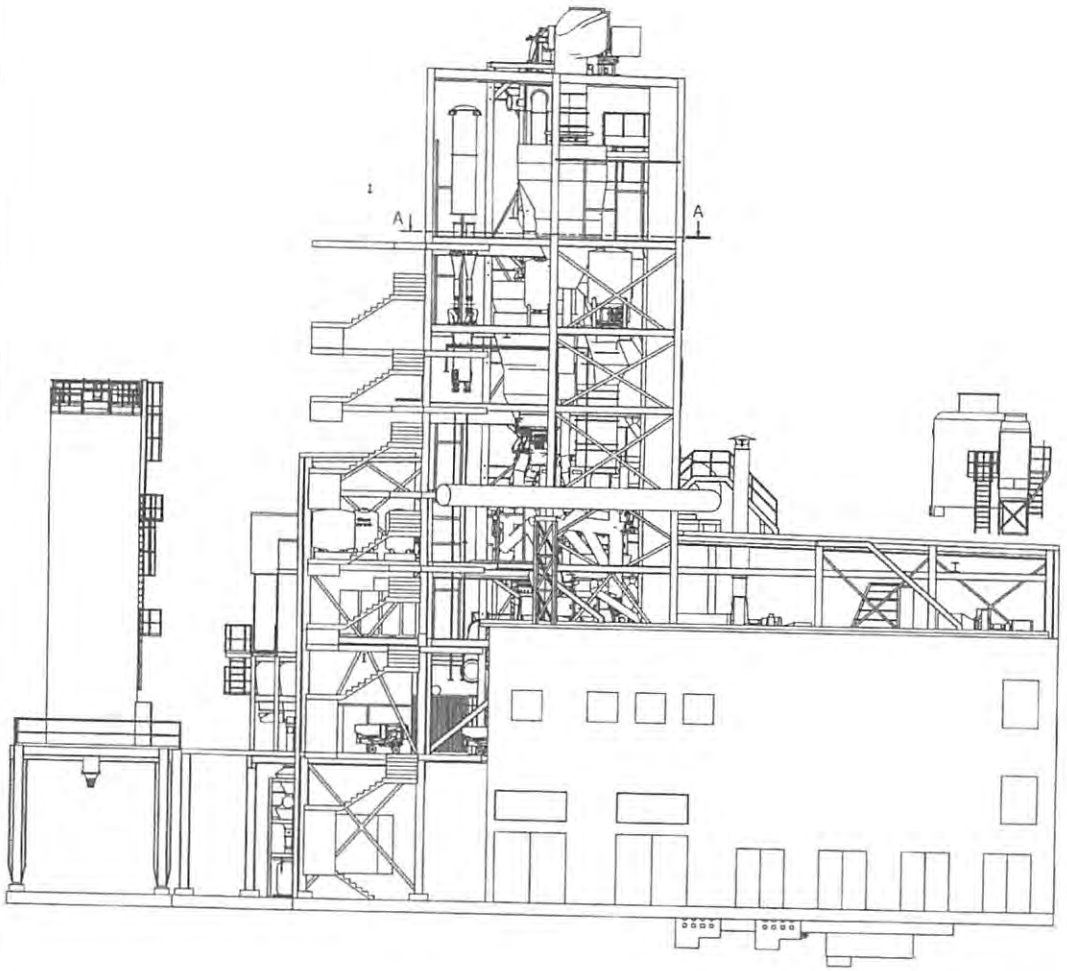

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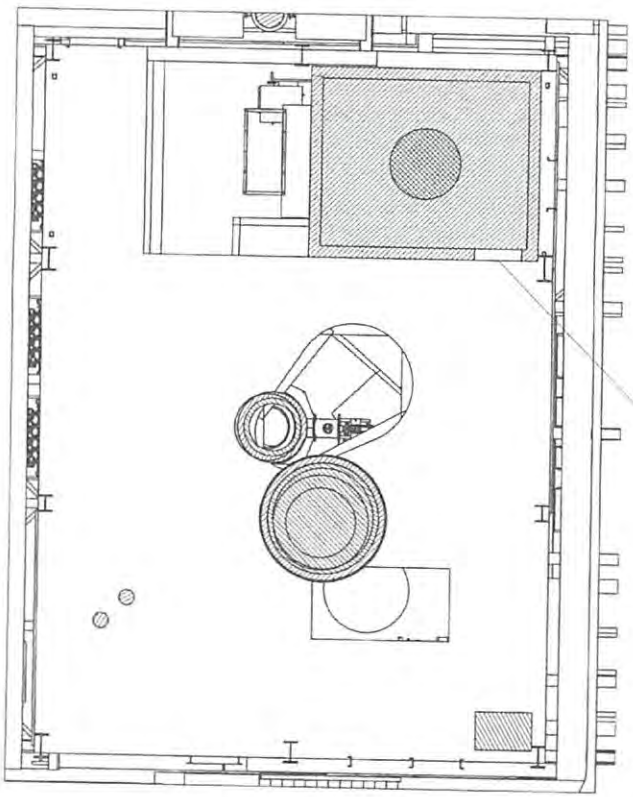

DIV. II Class 1

DIV. II Class 2

Unclassified

ROCKWOOL	Confidential	30-10-2017	
	B300 Hazardouz Location Classification		
		R0398-0300-08	

1 2 3 4 5 6 7 8 9 10 11 12

REVISION HISTORY

Vers .:	Init.:	Date:	Description of changes:
0	JaN /MHx	2017-10-09	Preliminary edition (coal and NG system not purchased)
0.4	JaN /MHx	2017-10-12	Implementation of document GPR-13-1444 Classification of NG
0.5	JaN/MHx	2017-10-31	PID numbers updated
0.6	JaN/MHx	2017-11-09	Added zone drawings etc.
0.7	JaN/MHx	2017-11-13	Building levels updated
0.13	AniNi	2017-12-06	Proofreading
0.14	KelKo	2018-02-22	Review prior to issue of version 1.0
1.0	KelKo	2018-03-15	Issued for construction
1.1	KelKo	2018-03-16	Yellow markings removed

Table of contents

1. Introduction

The purpose of this document is to describe the explosion risks and (*in EU ATEX*) hazardous location/zone classification connected to this, as well as the precautions made to meet the above risks, in relation to the Aquila melting process and the systems belonging to this.

The document thus only covers the melting process and not any other conditions on the same physical premises.

The evaluation of the areas involving dangers of explosion is based on corresponding evaluations of similar ROCKWOOL process plants in Denmark, the Netherlands, Poland, and USA.

1.1. Background

The ATEX-directive 2014/34/EU dictates that ROCKWOOL goes through the activities of the company in order - among other things - to identify, classify and mark out areas involving dangers of explosion. This means areas where explosive atmosphere may occur to a large or small extent.

This obligation is supplemented in ATEX-directive 2014/34/EU by an obligation to prepare an extended workplace evaluation which in future must be included as part of the already compulsory workplace evaluation. This document is intended as an appendix to this evaluation.

The scope of this document is to document:

- The explosion risks have been mapped and evaluated
- Zone classification of areas involving dangers of explosion has been made As far as the Aquila melting process is concerned.

1.2. Classification methodology

1.2.1. Dust system

The classification in this document is based on a class/division approach according to NFPA70 article 502. This is chosen because the alternativc classification withzones according to NFPA70 article 506 is not permitted according to NFPA652, 8.5.6.5 "Zone classification for dusts..."

1.2.2. Gas and liquids system

The classification in this document is based on a zoning approach according to NFPA70 article 505. This methodology was developed as an alternative to division classification as described in NFPA70 article 500 and 501. The zoning approach has been chosen because it is based on the IEC classification also used in Europe.

This means that the classification is according to NFPA497-17 zoning class (0,1,2) rather than division class (1,2).

1.3. Procedure for the classification

The classification is made through qualitative evaluations of:

- The probability of explosive atmosphere occurring and the duration of this
- The probability of ignition sources, including electrostatic discharge, being present and becoming active and act as ignition source
- The plant, the substances used, the processes and their potential interaction
- The extent of the expected consequences
- Which precautions have already been implemented and which new precautions – if needed/demanded will be implemented – to meet special risks from explosive atmosphere. In addition, the preparation of zone classification of areas involving dangers of explosion is included.

The classification is to be read and followed by the persons working in the areas covered by this document. This also applies to temporary staff, called-in workmen, repairmen, specialists, etc.

1.4. Scope and period of validity

The purpose of the classification is to prevent accidents and damages/injuries to persons, materials, products, buildings, and equipment, and to give a 100% overview of the areas involving dangers of explosions in connection with the arrangement and operation of the Aquila melting plant.

Premises/departments covered by the ATEX classification	Aquila plant and belonging auxiliary systems, including coal system, oxygen system, storage system, burners, etc.
The responsibility of preparing/updating the explosion protection document	The plant owner
Prepared by, date	Group Technology, November 2017
Valid until:	Factory take over or until considerable changes have been made

If or when changes are made in the project which may affect the risk influences, the classification is to be revised. The person responsible for this is the factory manager. Implemented changes are to be registered on a revision sheet.

1.5. Definitions

Risk area: Area, where explosive mixtures of gases, vapours, fogs and/or dust occur and in which the combustion after ignition spreads to the entire mix.

The risk area is divided into various zones/divisions as specified below:

1.5.1. Zones/divisiona of areas involving danger of explosion

The probability of the presence of explosive atmosphere and consequently the type of zone depends mainly on the discharge degree of the flammable material and the ventilation conditions at the discharge place.

Zones (gasses and liquids)

Dangerous areas are classified in the following zones based on how often an explosive atmosphere occurs and how long it lasts.

- Zone 0
  An area in which an explosive gas atmosphere is present continuously for long periods or often occors.
- Zone 1
  An area in which an explosive gas atmosphere is likely to occur occasionally by normal operation.
- Zone 2
  An area in which an explosive gas atmosphere is not likely to occur by normal operation, but which – should it occur anyway – only lasts for a short period.

Class II, Division (dust)

- Division 1
  In which combustible dust is in the air under normal operating conditions in quantities sufficient to produce explosive or ignitable mixtures,
  or
  Where mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced, and might also provide a source of ignition through simultaneous failure of electrical equipment, through operation of protection devices or from other causes.

- Division 2
  In which combustible dust due to abnormal operations may be present in the air in quantities sufficient to produce explosive or ignitable mixtures,
  or

Where combustible dust accumulations are present but are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus, but could as a result of infrequent malfunctioning of handling or processing equipment become suspended in the air,
or
In which combustible dust accumulation on, in, or in the vicinity of the electrical equipment could be sufficient to interfere with the safe dissipation of heat from electrical equipment, or could be ignitable by abnormal operation or failure of electrical equipment.

Flash point: The lowest temperature at which evaporation is so high that a flammable mixture occurs. (NFPA 497§3.3.8)

Lower explosive limit (LEL): The lowest concentration of vapours which may burn or explode if the vapours are ignited.

(EU) Ignition temperature (LIT): The lowest temperature of a heated surface where a 5mm dust layer is ignited in °C.

(USA) Ignition temperature (LIT): The lowest temperature of a heated surface where a 12,7 mm dust layer is ignited in °C.

(EU) Minimum ignition temperature (MiT): The ignition temperature of a cloud of dust in °C.

(USA) Minimum ignition temperature (MiT): The ignition temperature of a cloud of dust in °C.

(EU & USA) Minimum ignition energy (MIE): Minimum ignition energy of dust cloud in air in J.

(EU & USA) Minimum Explosible Concentration (MEC): Minimum explosible concentration in g/m^3.

(EU & USA) Maximum Explosion pressure (P_{max}): Maximum explosion pressure in kPa.

(EU & USA) Rate and maximum rate of pressure rise (dP/dt): Rate and maximum pressure rise kPa/s.

(EU & USA) Explosion severity (K_{st}): Explosion severity in bar*m/s

Temperature class: Classification of flammable mixture of vapours according to ignition temperature. (NFPA 497 table 4.4.2)

Explosion group: Classification of flammable gases according to maximum allowed slit width. The classification is based on the backfire ability of an explosion flame through a defined slit and its lowest ignition power.

1.5.2. References.

Article about distinguishing between the division and zone methodology in classification of Hazardous zones:
http://www.hubbell-killark.com/literature/2011NEC.pdf

2. Delimitation

2.1. Plant structure

The plant consists of

- Coal system
  - Receiving station
  - Coal silos
  - Conveying system
  - Intermediate buffer and dosing system
  - Coal burners
- Oxyfuel system
  - Oxygen storage tanks and evaporation
  - Oxygen control and distribution system
  - Natural gas control and distribution system
  - Oxy fuel burners
- Raw material system
  - Raw material receiving station
  - Crusher and sieve
  - Raw material storage
  - Raw material batching
  - Intermediate buffer and dosing silo
- Melting system
  - Furnace
  - Raw material preheating
- Flue gas system.
  - Flue gas path and flue gas cleaning system
  - Flue gas preheater
  - Thermal oil system

2.2. Delimitation of risk areas

The risk areas have been identified as follows:

P&I Q0398-	Area	Machine name	No further evaluation	Further evaluation	Remarks
0501	Coal storage	Unloading area		x	Par. 3.1
0501	Coal storage	Air cooler		x	
0501	Coal storage	Feeding system for coal silo		x	
0511/0512	Coal storage	Coal silo		x	Par. 3.2
0511/0512	Coal storage	Filter on coal silo		x	
0521/0522	Coal storage	Coal transport from storage silos to dosing silo		x	Par. 3.3
1010	Coal dosing	Dosing silo		x	Par. 3.4
1010	Coal dosing	Filter		x	
1010	Coal dosing	Safety filter		x	
1011	Coal weighing 1	Weighing bin for burner 1		x	Par. 3.5
1011/1021	Coal weighing 1	Coal transport to burner 1		x	Par. 3.6
1012	Coal weighing 2	Weighing bin for burner 2		x	Par. 3.5

P&I Q0398-	Area	Machine name	No further evaluation	Further evaluation	Remarks
1012/1022	Coal weighing 2	Coal transport to burner 2		x	Par. 3.6
1013	Coal weighing 3	Weighing bin for burner 3		x	Par. 3.5
1013/1023	Coal weighing 3	Coal transport to burner 3		x	Par. 3.6
1014	Coal weighing 4	Weighing bin for burner 4		x	Par. 3.5
1014/1024	Coal weighing 4	Coal transport to burner 4		x	Par. 3.6
1015	Coal weighing 5	Weighing bin for burner 5		x	Par. 3.5
1015/1025	Coal weighing 5	Coal transport to burner 5		x	Par. 3.6
NA	Coal dosing	Emptying system for emergency emptying		x	Par. 3.7
0575	Raw material system	Raw material silo	x		
0575	Raw material system	Distribution conveyor	x		
0575	Raw material system	Raw material silos	x		
0575	Raw material system	Conveyor system	x		
0575	Raw material system	Mixer – raw materials	x		
0575	Raw material system	Raw material transp.	x		
1070	Raw material system	Dosing plant raw materials	x		
1070	Raw material system	Dosing plant waste	x		
1000	Raw material system	Preheater cyclones	x		
1000	Raw material system	Multi cyclone	x		
1070	Raw material system	Feeding of materials into the furnace	x		
	Cooling	Cooling system	x		
1000	Aquila furnace	Combustion chamber		x	Par. 3.8
1080	Flue gas ducts	NH3-dosing		x	Par. 3.9
1062	Flue gas ducts	Flue gas exchanger		x	Par. 3.10
1065	Flue gas ducts	Desulphurization plant		x	
1063	Flue gas ducts	Flue gas filter		x	
1063/1068	Flue gas ducts	Ash container		x	
1035	Thermal oil system	Circulation, heater and tanks	x		
1041	Oxyfuel	Oxyfuel burner 1		x	Par. 3.11
1042	Oxyfuel	Oxyfuel burner 2		x	
1043	Oxyfuel	Oxyfuel burner 3		x	
1044	Oxyfuel	Oxyfuel burner 4		x	
1040	Oxyfuel	Natural gas distribution		x	Par. 3.12
	Oxygen	Oxygen storage and evaporation	x		Not evaluated in this document
1040	Oxygen	Oxygen distribution	x		

2.3. Description of flammable substances involving danger of explosion

2.3.1. Flammable liquids – gasses and solid substances in general

The properties of the substances which are specified in the safety data sheets/working instructions are used as basis for the classification of areas involving dangers of explosion.

Flammable liquids and gases are mainly included if they have a flash point < 22.8 °C or operated at a temperature above their flash point.
See further description: NFPA 497 § 3.3.6.

Flammable solid substances are included if the go/no-go test described in ASTM E1226 is followed

For flammable substances only the liquids and gas types which are common in ROCKWOOL are registered and which have the greatest influence on the explosive atmosphere.

Reference is made to ROCKWOOL safety data sheet/supplier instructions. Please note that the below list is not complete.

2.3.2. Flammable liquid Ammonia water

The following flammable liquids and gases are identified as requiring determination of dangers of explosion in atmospheric air:

Plant type: Ammonia water dosing NH_4OH (H_5NO)	
Placing: At the Aquila plant	
Technical data flammable liquids	
Name	Ammonia solution 19.9 *
Ignition temperature in °C	651 at 100%
Flash point in °C	Gas
Self-ignition temperature in °C	651
Relative vapour density (air = 1)	0.6
Lower explosion limit (% volume in air)	15
Upper explosion limit (% volume in air)	28 (33,6 acc. EN 60079-20-1 NH_3)
Density, vapour (air =1.0)	0.6
Boiling point in °C at 35% concentration	20
Boiling point in °C at 20 % concentration	38 °C
Weighted average:	68.21 °C
Vapour pressure in kPa	999.65
Mole weight g/mole	17.0
Max. allowed surface temperature of mechanical and electrical material	$T_{max\ total}$ = 80% of 651 °C = 521 °C.
CAS No.	7664-41-7

*Ammonia solution < 20% is not classified as a liquid which could liberate vapours involving dangers of explosion; no further ATEX evaluation required.

Ref. Safety data sheet from Airgas for Aqua Ammonia 5-19.9 %

2.3.3. Flammable liquid Thermal oil

Plant type: Thermal oil system (heat recovery)	
Placing: At the Aquila plant / flue gas heat recovery	
Technical data flammable liquids	
Name	Paratherm NF® Heat Transfer Fluid
Flash point in °C Pensky-Martens Closed Cup (D93 ASTM)	>149 °C
Auto-ignition temperature in °C	Not determined
Lower explosion limit (% volume in air)	Not determined
Upper explosion limit (% volume in air)	Not determined
Density (gram/ml) at 15,5 °C in kg/m^3	887
Boiling point in °C	343
Vapour pressure in kPa	<0.1 kPa at 20 °C
Mole weight g/mole	340
Max. allowed surface temperature of mechanical and electrical material	$T_{max\ total}$ = 80% of 149 °C =119 °C.
Explosion data.	Material does not have explosive properties. According to product safety data sheet.*

*no further ATEX evaluation is required.
Ref. Material safety data sheet from Paratherm NF

2.3.4. Flammable gas Natural gas

The composition of the natural gas as used in RAN5 is as follows (request date for test by Mountaineer Gas Company 2017-28-02)

Constituents:	Typical specification:
Methane	90,86 Vol. %
Ethane	8,56 Vol.%
Propane	0,29 Vol.%
Butane	0,00 Vol.%
Pentane	0,00 Vol.%
Hexane	0,00 Vol.%
Nitrogen	0,07 Vol.%
Carbon dioxide	0,22 Vol.%
Net calorific value	49,318 MJ/kg/ 38,269 MJ/Nm3

Since the gas consists of 91% methane, methane has been used for material classification. The resulting material classification is Class I Group IIA with an auto ignition temperature (AIT) of 600°C.

The resulting temperature class is based on good engineering practice as 80% of AIT is T1 (corresponding to max 480° surface temperature of the equipment).

Plant type: Natural gas installation	
Placing: Aquila furnace	
Technical data flammable gas	
Substance name	Natural gas (methane)
Substance type	Gas
Flash point in °C	Gas – therefore N/A
Self-ignition temperature in °C	600
Lower explosion limit (volume in %) (LFL)	5
Upper explosion limit (volume in %) (UFL)	15
Temperature class	T1
Relative density (air = 1)	0.6
Gas group	IIA (GroupD)
Data acc. NFPA 497 table 4.4.2	

2.3.5. Flammable dust Coal dust.

Flammable solid substances are included if these have a particle size of < 0.5 mm and are classified as involving dangers of explosion according to safety date sheet/working instructions.

Below coal dust values are based on the explosion test made by CHILWORTH 31.07.2013 on coal dust from HILLER Carbon, and on Chemical components document from HILLER Carbon 21.07.2014. Some of the parameters are taken on an conservative approach since a full test of the planned coal has not yet been conducted..

Plant type: Aquila plant	
Placing: Unloading place – storage silos – transport systems – dosing silo – weighing bin – emergency emptying system – coal transport to burner – Aquila furnace	
Technical data flammable material or material involving danger of explosion	
Name	Coal dust
NFPA 499 (Table 5.2.2) Ignition temperature of dust cloud or Layer in °C (LIT)	170
Lower explosion limit (LEL), Minimum explosive concentration (MEC, NFPA-654) in gram/m³	20 to 30
Higher explosion limit (UEL) in gram/m³	10.000
Average particle size in µm	99% b/w < 250
The moisture content of the dust in weight/%	< 10%
Conducting properties of the dust	Semi Conducting
K_{st} value in bar meter per second	187 (ST1)
Explosion class of dust (pressure increase by explosion)	ST1
Dust group NFPA 70 article 506 (Zone class)	IIIB
Dust group NFPA 70 article 500 (Zone class)	Class II , Group F
Explosion overpressure in bar (P_{MAX})	9,2
Minimum Ignition energy (MIE) in mJ	>500 and <1000
Maximum rate of pressure rise $(dP/dt)_{MAX}$ in bar/s	689
Max. allowed surface temperature of mechanical and electrical material (NFPA 70/500.8(D)(2)) (Temperature class acc. NFPA 70/500.8(C))	$T_{max\ total}$ = 165 °C Temp. class T3B or greater (T3C, T4, T4A, T5, T6)
Calorific net value	6900 kcal/kg

2.4. Explanation of classification

2.4.1. Background for classification of areas involving dangers of explosion

Area classification is a method to analyse and classify the environment in which explosive atmospheres may occur in order to ease the correct choice and installation of material which should be used safely in the environment in question, gas groups and temperature classes taken into consideration.

In most situations, where flammable substances are used, it is difficult to secure that an explosive gas atmosphere will never occur and whether electrical and mechanical material could be a source of ignition.

In situations where an explosive atmosphere is very likely to occur, one's trust is put in using electrical and mechanical materials which have a low probability of being an ignition source.

In order to reduce the probability of an explosive atmosphere occurring, explosion protected materials made after a rigorous standard could be used.

Classification of areas involving dangers of explosion occurring by unintentional or intentional events with flammable liquids and gases or solid substances, appear from the below classification tables for the specific areas/processes.

2.4.2. Explosive atmosphere

An explosive atmosphere can be defined as: "a mixture of air and flammable substances such as gas, vapour or fog/haze under atmospheric conditions as well as solid substances in which combustion spreads through the unconsumed mixture after ignition".

The following three conditions must be fulfilled at the same time in order for explosive atmosphere with dangerous effects to occur:

- The concentration of flammable substances in atmospheric air must be within the total explosion limit of the mixture
- Dangerous amounts of explosive atmosphere
- Active ignition source

2.4.3. Liquids and gases involving dangers of explosion

In places where flammable liquids are not present in atomized form, an explosive atmosphere will only occur if the liquid has a flash point less or equal to the temperature of the liquid or the surroundings plus 10°C.

2.4.4. Solid substances involving dangers of explosion

Almost all dust could explode when the dust is in atmospheric air and above a certain minimum concentration (Lower Explosion Limit (LEL). The lower explosion limit is typically between 10-100 g per m^3 air equal to a tight dust cloud where persons inside this are not able to see their e.g. their own outstretched hand. According to the ATEX-directive 2014/34/EU, there is no risk of formation of explosive dust atmosphere in places where flammable dust normally has a particle size > 0.5 mm. According to NFPA 70 art.506.6.C such materials should be a class III. Dust with moisture content normally > 15 to 30 weight % does not cause an explosive atmosphere.

The minimum limit according to the ATEX directive 2014/34/EU is that a sufficient amount must be discharged so that a coherent explosive atmosphere is formed, which is dangerous, normally more than 10 litres coherent atmosphere.
This limit is 200 liter according to NFPA 652 § 8.9.3.1

2.4.5. Temperature conditions at ROCKWOOL production line RAN5.

Normally, the following process and surrounding temperatures on ROCKWOOL are assumed:

Plant type	Temperature
In the open at unloading area for coal dust	-15…35 °C
Production areas near Industrial Melting Furnace	0...50 °C
Coal dosing rooms in Building 300	0...40 °C
Gas distribution container	0...40 °C
Aquila furnace	> 600 °C

A general temperature of 50°C is assumed, meaning that liquids and gases with a flash point above 50°C cannot cause an explosive gas atmosphere unless they are heated up or are present in atomized form. 10°C are thus to be added to the temperatures stated in the above table when classifying areas involving dangers of explosion.

3. Classification – risk evaluation of sub-components

3.1. Unloading place, air cooler and feeding system to coal storage silos

3.1.1. Description

The unloading place is organized in such a way that the tank trucks are connected to a hose system which is connected to the transport pipe for coal dust.

The coal dust is transported to the silo by means of a blower mounted on the truck.

3.1.2. Risk

During the transport there is a risk of frictions in the coal dust causing building up static electricity and thereby creating a risk spark formation. During the transport there is a risk of frictions in the coal dust and/or high temperature in the conveying air causing heating and self-ignition of the product.

There will be a high risk of explosive concentrations of coal dust being formed when the coal dust is blown into the silo. Hereby, the conditions of an explosion will be present.

The connection of the truck to the system will pose a risk of wrong mounting of the hose or leakage of this.

3.1.3. Evaluation

When connecting the blowing hose to the truck it is very important that a potential equalisation is made between the truck and the coal transport system. Hereby, the risk of spark formation due to static charging is eliminated.

Transport air must be kept cold in order to prevent acceleration of the exothermal process of the coal.

3.1.4. Classification

Plant type:	**Unloading area for truck**	**Classification table No. 001**
1. Flammable material: Coal dust (according 2.3)		
2. Discharge sources	**3. Discharge degree**	
Flange connections – couplings	Secondary/None	
4. Ventilation conditions		

Plant type:	Unloading area for truck	Classification table No. 001
Ventilation type	Natural	
Ventilation degree	Medium	
Available ventilation	Acceptable	
The ventilation speed on the unloading area is not obstructed by buildings or the like and a wind velocity > 0.5 m/s is considered probable		
5. Special installation conditions		
Unloading of coal dust shall not take place without the presence of a trained person. Instructions, safety signs and the safety control system secures that the tanker is potentially equalized and relevant temperatures are correct before the blowing of coal dust is started.		
6. Zone classification	**7. Zone extent**	
Zone 20	Inside in flexible hose from tanker to storage silo	
Zone 22	10 feet (3 m) around the flange connections and couplings	
8. Remarks to the zone classification		
Unloading of coal dust is supervised continuously by tank truck driver according to the ADR rules (EN) or HMTA (US)		

3.1.5. Measures

It is assumed that the coal supplier has measures and procedures in place preventing foreign elements being delivered together with the coal. This must be verified when contracting for the coal supply.

A protective device has been made to prevent emptying the truck before the potential equalization is connected. In addition, instructions on how to carry out the emptying are to be prepared.

Before filling into the silos, the connected hose must be visually checked for leaks and cracks.

If possible, the temperature and moisture content of the coal dust being delivered must be checked before feeding into the storage silos begins.

Air cooler is mounted on the system to secure against heating of the transport air.

Temperature at the top of the storage silo is monitored and unloading will be interrupted if temperature limits are exceeded.

The transport ducts are made with potential equalization of the joints.

The control system releases (open valve) only one silo at a time, preventing "wrong filling" of the silo´s.

3.2. Coal silo and safety filters

3.2.1. Description

The coal silos – which are placed outside - are made as approx. 118 m^3 silos with safety filters in the top. Through the filters necessary pressure equalisation is ensured, so that the silos are kept free of pressure and surplus air is blown off.

The filler pipe is equipped with an inlet valve which only opens when potential equalization is mounted.

The filler pipe is equipped with a quick acting shut off valve. The coal silos are equipped with connections for fluidization air. Dry and cooled air is used for fluidization.

3.2.2. Risk

When blowing coal dust into the silo, there will be a continuous explosive concentration of dust in the silo top. The explosive environment is separated from the surroundings via the silo wall and the safety filters which contain two barriers (filters).

The biggest risk of igniting the coal dust is to be found in the blown-in coal dust. The risk is caused by the fact that the carrying air for the transport also brings on an oxidation of the atmosphere and could thereby accelerate an ignition by incandesce.

In addition to this, there is a risk of static electricity generating a spark and thereby causing ignition of the dust.

Finally, components which are constantly or sometimes placed above the coal dust will be a potential ignition source.

Emptying the silo is done through a cellular dosing sluice.

3.2.3. Evaluation

It is of the utmost importance that ignition through the incoming dust in the silo is limited as much as possible.

A source search has not resulted in any cases of self-ignition of coal dust by road transport. There are, however, examples of ignition of coal dust by sea transport as the friction of the coal lumps has caused a chemical heating and self-ignition of the dust resulting in explosions. The coal supplied for the plant in question will be supplied only by road transport and the coal has been grinded and has had a degassing period of at least 10 days at the sup-